ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

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The Ries Electric Welding and Tempering System.

This invention is intended to provide a new method of welding and laying railway tracks, whereby rail lengths of any cross section may be permanently joined and laid end to end *in situ*, thus forming practically continuous rails and furnishing an almost perfect road-bed, free from rail joints and their attendant evils —chairs, fish plates, nut locks, etc. that have always been the fruitful cause of accidents and the chief source of expense for repairs and maintenance of way and rolling stock. The welding of two rails is effected by means of an electric current of large volume or heating capacity, which in the space of a few seconds brings the ends of the rails to a fusing heat. The joint thus formed is then compressed and tempered to its original degree of hardness, so that the wear on all portions of the rail surface is uniform.

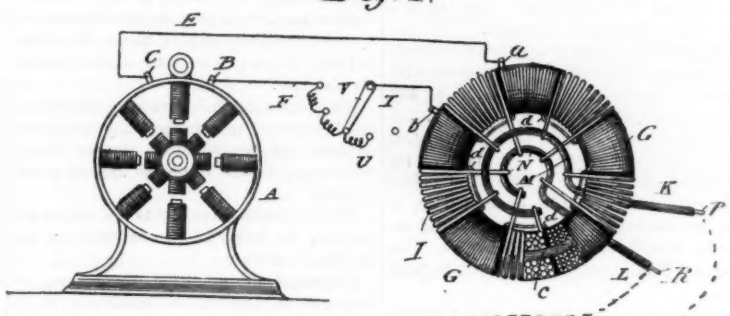
In the accompanying cuts we have reproduced the main features of the invention. In Fig. 1, *A* is a diagram of an alternating current dynamo, the wires from which lead to the binding posts *a* and *b* of an inductional transformer or converter of special construction. The purpose of this transformer is to convert the high-tension primary current generated by the dynamo *A* into a low-tension secondary current having the required volume to produce the necessary heating effect. The amount of current converted by the transformer is under perfect control, and is varied to suit the requirements of the work by means of a suitable switch. The transformed current is collected from the secondary coils of the transformer by the conductors *M*, *N*, whose terminals *P*, *R*, are connected, as shown in dotted lines, with the welding clamps *B''*, *B'*, shown in Fig. 2. These welding clamps are mounted upon an adjustable inclined platform *F''*, which, together with the dynamo and transformer, forms part of the equipment of the pilot or construction car.

In order to effect a weld between the extremities of two rails, the ends to be joined are secured respectively between the jaws of each clamp, as shown in Fig. 2, leaving a small part of each rail projecting into the space between the two clamps. Pressure is then brought to bear upon the upper clamp, which is movable and insulated from the lower clamp, so that the ends of the rails bear firmly against each other, and the current from the transformer is then gradually admitted to the welding clamps through the copper cables *D'' D''*. As the electrical resistance of the secondary circuit is greatest at the point of contact between the two rails, an intense heat is developed at that point which almost instantly fuses and unites them. The current is so graduated as to do this without affecting the re-tempering properties of the metal, and as soon as one joint is formed the clamps are moved forward, the tempering box *J* slipped over the joint, and the operation repeated at the next joint. The welding platform or car is moved forward progressively as the successive rail sections are united, the same engine that runs the welding dynamo being used for propelling and transferring the pilot car.

Figs. 5 and 7 represent various forms of clamps for holding the rails in alignment during the process of welding, and these clamps are so constructed as to permit of quick and rapid work. The clamp shown in Fig. 7 produces a ribbed joint, as illustrated in Fig. 10, which is found to give an extremely strong and tenacious juncture. Means are also provided for compressing the metal while under the influence of the current, thereby producing a smooth and finished joint that has a much greater tensile strength than any other portion of the rail.

It will be evident that some means must be provided to permit of expansion and contraction of the continuous rails thus formed. Mr. Ries proposes to divide each rail into sections one-quarter of a mile in length, fasten these sections at their center and allow them to expand in both directions. A divided expansion joint, Figs. 9 and 11, is formed on the ends of each section, this joint being so arranged as to give a solid support to the wheels while passing, so that practically the entire track is one smooth, continuous way.—*Street Railway Journal.*

Fig. 1.



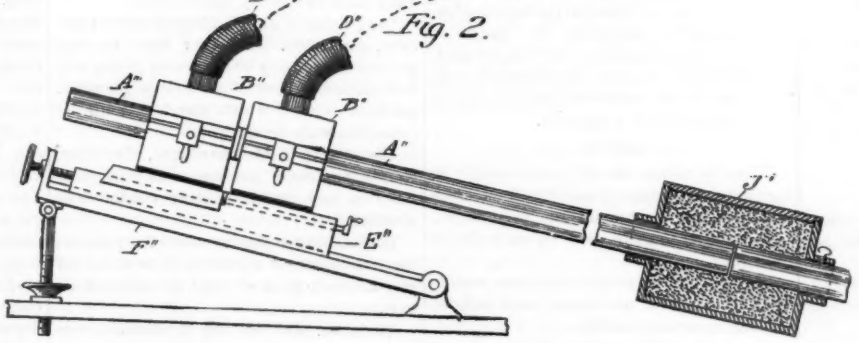


Fig. 2.

Fig. 5.

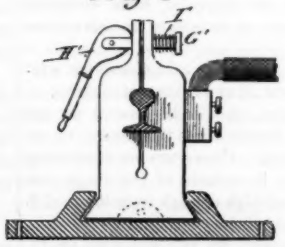


Fig. 7.

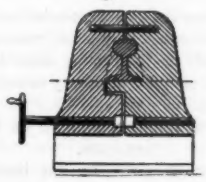


Fig. 11.

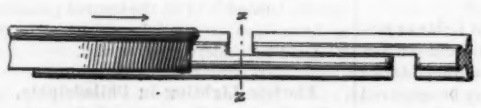


Fig. 10.

Fig. 9.

THE RIES ELECTRIC WELDING AND TEMPERING SYSTEM.

Electric Light Wiring Rules.

REGULATIONS OF THE BOSTON FIRE UNDERWRITERS' UNION, FOR THE USE OF ELECTRIC LIGHTING APPARATUS. APPROVED NOVEMBER 1, 1887.

ARC LIGHT WIRES.

Conducting wires must be seven feet above roofs, and placed so as to avoid ladders of the fire department and fire shutters.

Whenever electric light wires are in proximity to other wires, dead guard wires must be placed so as to prevent any possibility of contact with foreign wires, in case of accident to the wires or their supports. Conducting wires must be secured to insulating fastenings, and covered with an insulation which is waterproof on the outside and not easily worn by abrasion. Whenever wires pass through walls, roofs, floors or partitions, or there is liability to moisture, abrasion, or exposure to rats and mice, the insulation must be protected with rubber, stone ware or some other satisfactory material. Wires entering buildings must be wrapped with tape and bent in such a manner that it will prevent the water entering the building. All wires passing over or under steam, gas or water pipes, must have a good insulation between them and the pipes. Blocks of wood are the most desirable. This rule also applies to foreign wires—they should be treated the same as pipes. Wires should go over water pipes, where it is possible, so that the moisture will not settle on the wires.

Hard rubber hooks are not desirable as fastenings, and tacks or staples must in no case be used for fastenings or brought in contact with the wire.

In damp places, wires must be run on glass insulators, and kept entirely clear from contact with inflammable material and any substance likely to make a ground connection.

The use of lead-covered wires, or wires whose covering contains paraffine, is prohibited.

The use of Underwriters' wire will not be passed where it is concealed in any manner. It must be in plain sight, on the walls or ceilings. Wire that is covered with moulding must have a water-proof insulation that is approved by this Union.

Joints in wires to be securely made and wrapped with tape; soldered joints are desirable, but not essential. Wires conducting electricity for arc lights must not approach each other nearer than one foot.

Care must be taken that the wires are not placed above each other in such a manner that water could make a cross connection.

Cut-off boxes for arc lights must have the words *On* and *Off* marked on them. They must be placed in a well-protected and accessible place, so that they can be operated by the firemen or police.

ARC LAMPS.

For arc lamps, the frames and other exposed parts of the lamps must be insulated from the circuit. Each lamp must be provided with a separate hand-switch, and also with an automatic switch, which will close the circuit and put the lamp out whenever the carbons do not approach each other, or the resistance of the lamp becomes excessive from any cause. The lamps must be provided with some arrangement or device to prevent the lower carbons from falling out, in case the clamp should not hold them securely.

For inside use, the light must be surrounded by a globe, which must rest in a tight stand, so that no particles of melted copper or heated carbon can escape; and when near combustible material, this globe must be protected by a wire netting. Broken or cracked globes must be replaced immediately. Unless a very high globe is used, which closes in as far as possible at the top, it must be covered by some protector, reaching to a safe distance above the light.

INCANDESCENT WIRES.

Conducting wires must be seven feet above roofs, and placed so as to avoid ladders of the fire department and fire shutters. All connections must be soldered and wrapped with tape.

Whenever the electric light wires are in proximity to other wires, dead guard wires must be placed so as to prevent any possibility of contact with foreign wires, in case of accident to the wires or their supports. Conducting wires must be secured to insulating fastenings, and covered with an insulation which is water-proof on the outside and not easily worn by abrasion. Whenever wires pass through walls, roofs, floors or partitions, or there is liability to moisture, abrasion, or exposure to rats and mice, the insulation must be protected with rubber, stoneware or some other satisfactory material. Wires entering buildings must be wrapped with tape, and bent in such a manner that it will prevent the water entering the building. All wires passing over or under steam, gas or water pipes, must have a good insulation between them. Blocks of wood are the most desirable. This rule also applies to foreign wires—they should be treated the same as pipes.

Soft rubber tube is not desirable as an insulator.

Wires should go over water pipes, where it is possible, so that the moisture will not settle on the wires.

Where incandescent wires enter buildings, they must have double-poled safety catches as near the entrance as possible.

The main wires must not be less than two and a half inches apart, except where they are in grooves.

The use of lead-covered or wires whose covering contains paraffine is prohibited.

All wires that are fished over the ceiling or in the walls, must have a water-proof insulation satisfactory to this Union. This rule also applies to wires covered with moulding, or concealed in any manner.

Where Underwriters' wire is used, it must be in plain sight on the walls or ceilings.

Care must be taken that the wires are not placed above each other in such a manner that water could make a cross connection.

Wires that are run in damp places must be run on glass or porcelain insulatators of suitable form.

For incandescent lamps, the conducting wires leading to each building, and to each important branch circuit, must be provided with an automatic switch or cut-off, or its equivalent, capable of protecting the system from any injury due to an excessive current of electricity. These devices must be proportioned to protect the smallest wire in the loop to which they are attached.

On all loops of incandescent circuits, safety catches must be used on both sides of the loop, and switches on such loops should be double poled.

Ceiling blocks that are used on pendant drops must have safety metals in them where flexible cord is used. Cord should have a knot tied in it with the knot on the top side of the block, so that the strain will come on the knot instead of on the connection; and where it is possible, a knot should be inside of the socket, the same as the block.

The small wires leading to each lamp from the main wires must be very thoroughly insulated, and if separated or broken, no attempt made to join them while the current is in the main wires.

When wires are put on gas fixtures, the fixture must be isolated from the main pipe, and the insulator used for this purpose must be made so that the sediment in the gas will not form a connection over the insulating material.

Chandeliers or brackets attached to any ground connection must have insulating yokes or couplings on them. Individual insulating of lamps at the sockets will not be passed except on brackets in special cases that may be approved by the inspector.

DYNAMO MACHINES.

Dynamo machines must be located in dry places, not exposed to flyings or easily combustible material, and insulated upon wooden foundations. They must be provided with devices capable of controlling any changes in the quantity of the current; and if these governors are not automatic, a competent person must be in attendance near the machine whenever it is in operation.

Each machine must be used with complete wire circuit; and connections of wires with pipes, or the use of ground circuits in any other method, are absolutely prohibited.

The whole system must be kept insulated, and tested *every day* with a magneto for ground connections in ample time before lighting, to remedy faults of insulation, if they are discovered; and proper testing apparatus must in each case be provided. This applies to both central station and isolated plants.

Testing circuits for grounds with a battery and bell is not considered a reliable test.

Preference is given for switches constructed with a lapping connection, so that no electric arc can be formed at the switch when it is changed; otherwise the stands of switches, where powerful currents are used, must be made of some incombustible substance which will withstand the heat of the arc when the switch is changed.

MOTORS.

Wires for motors should be run exactly as for lamps on similar circuits. On low tension circuits where motors are run in multiple, safety catches must be used on each side of the circuit.

On high tension circuits the same restrictions apply as for arc lamps, and suitable cut-outs must be provided.

Motors must be treated as dynamos as regards insulation, flyings, dampness, etc.

While these rules are intended to be complete, some cases may arise where, in the judgment of the inspector, some deviation from them may be necessary in order to secure safety.

RULES FOR RUNNING INCANDESCENT CIRCUITS FROM ALTERNATING MACHINES.

Outside wires should be treated as arc light wires; inside wires the same as incandescent circuits. Converters on alternating circuits must be outside of buildings, and must be placed high enough from the roof to prevent possible injury to firemen.

RULES TO APPLY TO THE RUNNING OF INCANDESCENT CIRCUITS WORKED FROM ARC CIRCUITS.

The running of incandescent lights or systems on arc circuits should be avoided; but wherever this is unavoidable, a proper device or "distributor," such as may be approved by this "Union," must be provided to prevent the possibility of an excessive arc current being thrown on to any one portion of the incandescent system; such device or "distributor" *must* have the approval of this "Union" before it is put in operation. It must remain open to inspection at all times, and no change made in any part of the installation after it has been approved, without consent of this "Union."

Only such wire as has been approved by this "Union" shall be used in constructing lines and circuits.

Wires must be run in plain sight. In damp places they must have a water-proof covering.

The positive wire or wires must be kept at least two and a half inches from the negative wire or wires in running from the distributor or regulator, to the fixtures and lamps, and return; except that "twin wire" may be used for a single lamp.

No wires should be run through partitions, floors or walls, without being encased in a tube of hard rubber, porcelain, or covered with tape. Soft rubber tube is not desirable as an insulator.

The "safety fuses" must be so proportioned that they will melt long before the wire is heated to an unsafe degree.

Dust must not be allowed in the distributor-box or any of the electrical connections.

The contact points should be kept clean, and care should be taken to insure solid electrical connections at all the points of contact, and all parts must be kept free to move easily.

In case any defect should arise in the distributor or regulator, or the wiring thereto, it must be arranged so as to automatically and absolutely shunt off from the arc circuit at once.

In working distributors, the line or circuit current must be kept at its standard amount by tests made by ampere meter, from time to time. In no case must the amount exceed the standard.

Every company shall have a competent and reliable person to examine, daily, every distributor and regulator, or similar device which may in the future be applied to arc circuits.

Where incandescent lights are run on arc circuits, the following-named practices are *strictly prohibited:*

Fastening or attaching electroliers, or lamps, to any gas fixture which may be in electrical connection with the earth.

The running of *concealed* wires to the electroliers, or lamps, *under any circumstances.* They must be entirely open to view.

The placing of any distributor box or regulator, electrolier, bracket, or lamp in such position that it may be connected in any way with any other wires, steam fittings, gas pipes, gas fixtures, etc., which may be electrically connected with the earth.

The placing of the distributor, electrolier, etc., in any damp location, or in close proximity to any metal or other conductor of electricity.

The building or placing of anything around the distributor or regulator so as to cut off easy access to it, or obstruct the access of air to it.

All joints, after leaving the distributor or regulator, must be soldered, using acid as flux. Resin will not be approved under any circumstances.

All new devices should be submitted to the inspector of the "Union," and must be approved by him before permission can be given for their use.

While these rules are intended to be complete, some cases may arise where, in the judgment of the Inspector, some deviation from them may be necessary in order to secure safety.

THE FOLLOWING FORM SHOULD BE USED IN POLICIES.

Permission is given for the installation and for the use of such wires, lights, and apparatus of any electric light or electric power system, located in or on the insured premises, as have been or shall be approved by the Boston Fire Underwriters' Union.

Electric Lighting in Philadelphia.

The Electrical Committee of Councils approved of the annual estimate of the bureau, amounting to $239,980.50 for next year. This is an increase of about $25,000 over last year, the additional amount being intended to extend the electric light system throughout the city. During the discussion of the various items in the bill, Director Stokley stated that it was the intention to ask councils for an appropriation sufficient to erect electric light plants, one on the Delaware front and the other along the Schuylkill. He said that a year's time would be required to construct the necessary plants, but that when erected and in full operation, a handsome revenue would be derived from private sources to the city. No location had as yet been definitely considered, but the director thought that the old Kensington Water Works, at the foot of Otis street, which will soon be abandoned by the water bureau, would make an excellent location for the plant. In answer to an inquiry, he said that the two plants would cost from $350,000 to $400,000.

The Brussels Electric Tramway.

An interesting paper on the electric tramway of Brussels has been contributed by Mr. A. Bandsept to the proceedings of the Societe des Anciens Eleves des Ecoles Nationales d'Arts et Metiers. The cars on this line are propelled by a motor placed under the floor, and a current is supplied by Julien accumulators, which are inserted under the seats from the sides, and not from the end of the car, as in Reckenzaun's arrangement. The battery is divided into sections, and contact springs are fitted which establish the continuity of the circuit by the action of pushing each section in. The grids, or supports, of the active material in the accumulator plates are cast of an alloy containing ninety-five parts of lead to three and one half parts of antimony and one and one-half parts of mercury. It is claimed for this composition that the grids are very stiff, inoxidizable, and that the surface of the metal insures firm adherence of the filling-in paste. Two batteries are required for each car, so that one may be in service while the other is being charged. During the last five months the regular routine was to run thirty miles before replacing the battery. The total weight of the car in working, and with its full complement of passengers, is six tons. The weight of the battery is thirty cwt., and the 120 cells composing it can be united, 30, 60, 90, or all in series, producing an electro motive force of respectively 60, 120, 180 and 240 volts. These different combinations are produced by a regulating switch, by which the speed of the car is controlled. The electromotor is fixed to the under side of the car floor near one of the axles, and works by means of rope gear, an intermediate shaft suspended between the two axles of the car. From this countershaft motion is transmitted to one of the axles by a pitch chain. The motor is scarcely powerful enough for the work, but its general arrangement is convenient. The field magnets are compound wound, so as to increase the torque on steep gradients when the current is large. The commutator and brushes present a special feature. There is a double commutator, the sections of one being connected with those sections of the other which are diametrically opposite, so as to bring the positive and negative brushes side by side, and not on opposite sides of the commutator, as generally arranged. There are two sets of brushes so connected that when one pair is on the other pair is off, and by this means the direction of motion is controlled.

Heat from Electricity.

One of the newer applications of electricity was shown, with beautiful stage effect, in the production of Wagner's opera, Siegfried, in New York, on Wednesday night. In the course of the opera, Siegfried wields anew the broken sword "Nothung," and electricity is brought in to make the scene effectual. Just how the current is applied, or what work it does, the reports do not say, but it was shown, at a recent meeting of electricians in New York, that a current can be so used as to fuse the surfaces of two pieces of metal and admit of their being forged, as in an ordinary furnace. This may not amount to much for spectacular purposes—although it will sometimes enable the actors to dispense with an inconvenient fire on the stage—but it amounts to a great deal for mechanical and scientific uses.

For one thing, it is likely to render the picturesque but dangerous blacksmith shop a thing of the past. The roaring forge, the flying sparks, the puffing bellows, will be replaced by a couple of innocent-looking wires, and the broken rod will be spliced or the incipient horseshoe brought to a glow in less time and with far less danger of starting a conflagration than by the present method. Electricity as a means of heat is an extension into a new field, and one of almost unlimited possibilities.—*Philadelphia Inquirer.*

Electric Light Versus Gas.

Behold, it came to pass that a certain gas man of the city of Charleston, waxing wroth, did write in these words:

"I have read with interest your article in *Dixie* upon the cost of erecting electric light plants, and the probable dividends they will pay. I am largely interested in gas stocks, and your communication contains some points that I would like to inquire into more fully. My experience has been that the electric light is too white and glaring, that it attracts millions of bugs, and that it throws a ghastly pallor over everything. The carbon points are apt to extinguish themselves at most inopportune times and leave everything in darkness, and the flickering of the light would, in my opinion, make it undesirable for lighting dwellings. We use the light here for large stores and street lighting, and in Savannah and Augusta it is also used. Is there not a plant in Atlanta? Suppose a man has his house fitted with gas pipes and the light is the same price as the electric, why should he incur the additional expense of running wires through his house to put in the electric light? Good water gas or naphtha gas is good enough for any sensible white man, and it seems to me you don't take into consideration the fact that no man will put in a new-fangled light unless he can save money. I should be glad to have some light (not electric, but good, common sense light) on this point."

In the first place, our friend from the earthquake city evidently does not know the difference between an arc light and an incandescent. The light he describes is the arc, which is formed by a tremendous current of electricity passing through two pieces of carbon whose points are placed nearly together. This light is suitable for street lighting. The incandescent lamp is about the size of a turkey egg, and consists of a glass bulb in which is enclosed—in a vacuum—a platinum wire or bamboo fiber. Through this a current of electricity is passed and the platinum or fiber becomes incandescent, giving a soft light equal in brilliancy and softness to sixteen wax candles, hence the term sixteen candle power lamps.

The incandescent lamp can be held in the hand while burning. It does not attract insects as much as kerosene or gas, as the light is softer. It does not throw "a ghastly pallor" at all; in fact, it is the only light by which silks and other dress goods retain at night the same color as in the daytime. It is impossible for the light to flicker, as a patent governor on the engine causes the dynamo to run with perfect evenness, and when the light goes out through accident to the "bulb," it takes but three seconds to set it aright, the "bulbs" being so perfectly adjustable that a child can put one in place in five seconds. The principal question asked by our Charleston friend is as to the cost of putting in the light. In reply I can but say that it is customary for the electric light company to do all wiring at its own expense, so that the house owner—especially if he is building and wants to save a plumber's bill—finds it decidedly advantageous to use electricity in preference to gas.

"*Good water gas, or naphtha gas, is good enough for any sensible white man.*" Is it? This is a question that certainly has two sides. From an official report I condense the following figures, relative to fires in New York city during twelve months:

Fires caused by kerosene..	259,	loss $94,657
Fires caused by matches....	35,	loss 22,570
Fires caused by candles....	88,	loss 30,667
Fires caused by gas	110,	loss 128,174

And yet "gas is good enough for any sensible white man," is it? During the twelve months alluded to there was *one small fire* (damage about $60), in one of the engine rooms of an electric incandescent establishment, the only fire during the year caused by incandescent apparatus. It should be borne in mind that it is impossible for an incandescent lamp to set fire to anything.

And still another point: Gas throws off sulphur, ammonia, carbonic acid and sulphuretted hydrogen; it consumes the air, vitiates the atmosphere, consumes the oxygen; makes all colors unnatural; the light is unsteady and there is always danger from asphyxiation and the use of matches; there is expense from leaks in the pipes and from water and air in the burners; there is expense from the freezing of pipes; there is always danger of explosion and of fire from some leak in the pipes; the ceilings and decorated walls get smoked and metals in the rooms where gas is constantly burned tarnish quickly; while each year scores of fatal accidents are reported in hotels due to carelessness in the use of gas. The recent horror at the Olympic Theater in Paris is an illustration in point too. And yet "gas is good enough for any sensible white man" is it?

Another illustration and I am done. Two "six foot gas burners" (12 feet per hour) consume, in an ordinary room, in one hour, 17.25 cubic feet of air and 5.47 cubic feet of oxygen. During this same hour 34 525 cubic feet of air has become vitiated, and the gas has produced and disseminated into the lungs of the occupants of the room 3.21 cubic feet of carbonic acid. One pound of water placed in a room twenty feet square unoccupied, in which two gas burners are lighted, willl increase *one degree* in temperature in one hour. If the room is occupied it will increase half a degree more. Is it any wonder we are a race of consumptives and bronchitisites? And yet "gas is good enough for any sensible white man."

Mark the prediction—the days of the gas plants are numbered. Electricity is the light of the future. Our grandfathers thought candles "good enough" till they got gas. Now we, in our turn, will discard the gas and take up the newer light because it is cheaper, healthier, prettier and less dangerous, and because there are *some* "sensible white men" who are of the opinion that gas is *not* "good enough" for them.—*Dixie.*

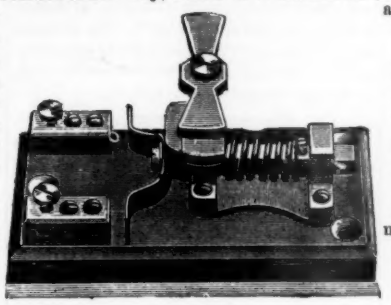
The Westinghouse Automatic Electric Air-Brake.

By H. Hollerith.

In addition to the ordinary Westinghouse experimental equipment the train at Burlington was equipped with a small battery on the engine, and an electric switch connected with the engineer's valve in such manner that when the valve was brought to a position to apply the brakes quickly, as for an emergency stop, a circuit from the battery to a wire extended throughout the train was closed. The wire forming this circuit was carried inside the train pipe and air hose. The connection from car to car was made automatically when coupling the air-hose, by insulated, spring-actuated, metallic contact buttons located in the center of the air-hose couplings. Several portable electric valves were used. These were so arranged that they could be carried anywhere between the ordinary air-hose coupling and a coupling piece secured to the end of the train pipe. When these valves were thus coupled in position the circuit would be made through the coils of an electro-magnet, the armature of which operated a valve controlling communication from the train pipe to the atmosphere. Several of these valves were carried in the train, as, for example, one at the end of the twentieth and one at the end of the fortieth car. When now it is desired to make an emergency stop, the engineer's valve is brought to such a position that the circuit from the battery is closed through these electro-magnets, so that the train pipe is opened to the atmosphere through these portable valves at the same time with the engineer's valve, thereby quickly reducing the pressure throughout the train pipe and thus applying the brakes through the action of the triple valves. These electric valves are not used in applying the brakes easily, or in graduating the brake, which is done as with the ordinary Westinghouse brake. To release the brakes the circuit is broken, and the train pipe is then charged from the main reservoir on the engine in the usual manner, the time required to release the brakes being thus largely dependent upon the length of the train.

Improved Electric Light Switch.

We are indebted to *Industries* for the annexed illustration, which represents a new and simple form of switch which has recently been patented, and of which Messrs. Rose & Co, Manchester Road, Bradford, England, are at present the sole makers. The special advantages claimed for it are: That the surfaces are kept together under pressure, and hence perfect contact is obtained; that the contact can be broken instantly, which is a notable advantage; and that, owing to the simplicity of its construction and the strength of its few parts, it is not likely to get out of order. The terminals are connected by a bow spring mounted on a slide. The spring is moved into contact by a cam, which keeps it bent, and thus maintains it in contact with the terminals under pressure. When the cam is turned through a small angle, a spiral spring acting on the slide at once breaks the contact. Owing to the symmetrical form of the cam, the handle may be turned either way, which is a distinct advantage. These switches have been used for some time past in cotton mills, private houses, offices, and fine art galleries, with satisfactory results. They have been specially designed for safety, and are mounted on slate or marble bases in a substantial manner. We understand that they are made in various sizes, suitable for use with one lamp, or for main cables supplying up to two hundred lamps, and at a price which is likely to bring them into extended use.



Rose & Co's Switch.

The Light of the Future.

By James Sternes.

Unquestionably the light of the future will be produced by electricity. Its advantages as a street illuminant are so obvious that presentation of them will not be required in this brief article. In the matter of street lighting, however, the public is as vitally concerned as are the individuals or corporations who secure the contracts for illumination. The public pays, therefore the public should acquaint itself with the value of the article it is asked to purchase. Discrimination is the bane of city builders. While the continental transportation company which builds up one city at the expense of a neighbor is a public enemy, what epithet shall describe the domestic corporation which, by corrupt combinations with the home rulers, prevents the community upon which it has fastened from getting light or any of the necessaries of life as cheaply as rival cities are supplied therewith?

The steady growth and development of the South signifies a similar growth and development of illuminating companies within her borders, and I regard the South as a most promising field for profitable investment in such enterprises. Naturally, the investor looks only for profit and the highest possible percentage thereof, but against undue extortion, the public can, in large measure, protect itself if it knows what the commodity sells for in a number of places.

I present here a list showing the prices paid for gas for private and street illumination, by twenty-two cities:

Cleveland, $1.00 per 1,000 feet.

Chicago, $1.00 per 1,000 feet.

Baltimore, $1.00 per 1,000 feet, and 50 cents in part of the city.

Toledo, $1.00 per 1,000 feet.

Pittsburgh, 75 cents per 1,000 feet

Cincinnati, $1.06 per 1,000 feet.

Milwaukee, $1.30 per 1,000 feet.

New York, $12.20 each lamp per annum.

Brooklyn, $21.59 each lamp per annum.

Sandusky, O., $16.50 each lamp per annum.

Minneapolis, $15.63 each lamp per annum.

Washington, $20.00 each lamp per annum.

Buffalo, gas per 1,000 feet costs $1.40, and gas per lamp per annum costs $23 40.

Kansas City, Mo., $2 per 1,000 feet.

Providence, R. I., $1.50 per 1,000 feet.

Worcester, Mass., $1.50 per 1 000 feet.

Lynn, Mass, $1.80 per 1,000 feet.

St. Paul, Minn., $29 52 each lamp per year.

New Haven, Ct., $28.00 per lamp per year.

It is not my purpose at this time to make comparisons between cities, or to inquire why this illuminant should cost more in one place than in another. Further on, I may, in a general manner, refer to it. In twenty-nine cities the streets are lighted by electricity at prices as below:

Portland, Me., $156.25 a year per light.

Minneapolis, Minn., $150 a year per light.

Brooklyn, $177 a year per light.

Quebec, Canada, $80 a year per light (arc).

Toledo, O., $152 50 a year per light (arc).

Sandusky, O., $80 a year per light.

Portland, Oregon, $140 a year per light.

Watertown, 28 cents per light per night.

Syracuse, N. Y., 40 cents per light per night.

Schenectady, 47 cents per light per night.

Troy. 47 cents per light per night.

New York, 37½ cents per light per night (arc).

Joliet, Ill., 27 cents per light per night.

Jackson, Mich., 24½ cents per light per night.

Erie, Pa., 40 cents per light per night.

Poughkeepsie, 22¾ cents per light per night.

Newburgh, 33 cents per light per night.

Detroit, Mich., pays $125,000 a year for the total cost of lighting the whole city. No gas is used.

Buffalo is paying $115,000 a year for electric lights that cover one quarter of her streets.

Albany, 50 cents per lamp per night.

St. Paul, Minn., 50 cents per lamp per night.

New Haven, Ct., 55 cents per lamp per night.

Worcester, Mass., 55 cents per lamp per night.

Lynn, Mass., 47½ cents per lamp per night.

Kansas City, Mo., 55 cents per lamp per night.

Washington, 65 cents per lamp per night.

Toronto, Ont., 55 cents per lamp per night

Providence, R. I., 50 cents per lamp per night.

Philadelphia, Pa., 55 cents per lamp per night.

It will be observed that the cost to the public varies widely. The only point I wish to make is that effort has been put forth to secure information from cities where conditions were widely dissimilar. For instance, Watertown is quoted as paying but 28 cents per light. This would appear to be an exceptionally low price, but when it is known that her lights are extinguished at midnight, it will be apparent that the price per light is comparatively high, yet it may yield the light company but slight profit.

Brooklyn is cited as paying $177 per light per year, or 49 cents per night, but only 1 200 candle power light at this price is furnished. Minneapolis pays only $150 per light per year, but that is because water power is used.

Sandusky pays $80 per light per year. The lights burn, however, only to twelve o'clock.

Erie pays 40 cents. The lights are all 1,200 candle power. Albany is quoted as paying 50 cents per light. The city owns and maintains the electric lamps and pays 50 cents per light in addition.

Figures from 174 of the prominent cities of the United States and Canada show the average price paid in 98 cities for 2,000 candle power lights to be 66½ cents per light per night, and for 1,200 candle power lights 76 cities pay an average of 46¼ cents per light per night. These are reliable figures, and those interested may place dependence upon them as such, and they may be regarded as supplying in fair degree an approximation of what prices may be obtained by companies or corporations engaged in the business of electric lighting.

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We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Mr. C. C. Haskins, 118 LaSalle Street, Chicago, Ill., will represent the REVIEW in the West
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The primary battery electric lighting frauds still keep popping up to fool the gullible public.

The storage battery, particularly for electric lighting purposes, seems to have come to stay. A number of improvements are in the air, and the REVIEW hopes to announce them soon.

Mr. George Westinghouse has been elected president of the Consolidated Electric Light Company, of New York, Captain H. R. Garden remaining as vice-president and counsel.

The electrical press of London is endeavoring to form an association of electrical engineers. The idea seems to meet with a good deal of favor among the leading electrical workers of England.

Our London contemporary, *The Electrician*, has made several marked improvements in its typographical appearance. The arrangement of its contents is particularly excellent, and the journal throughout presents the work of the careful and capable editor.

Meanwhile, don't let us forget that the electric heater is in existence. A prominent electric light man soon expects to give an exhibition of "heating, lighting and cooking by electricity." The REVIEW hopes to be represented in the sampling of the cooking.

There will probably be some interesting developments among carbon makers in the next few days. The value of the carbon patents owned by the various companies are, it seems, to be subjected to a suit, which will show the value of the Brush patents compared with those owned by other manufacturers.

The readers of the REVIEW will all be interested in the report of the discussion on "Deep Sea Sounding," sent us by Mr. A. E. Kennelly, of the Eastern Telegraph Company, London. Letters from Mr. Kennelly, whose researches in the higher branches of electrical work are widely known, will appear in the REVIEW from time to time.

Improvement is the order of the day in all branches of electrical work. The electrician is never thoroughly satisfied that he has done his best, and although the financial end of his company is often disposed to call a halt, he keeps pegging away with an ideal always just a little ahead. It is to this, that much of the improvement in electrical operations has been brought about.

W. J. Armstrong, formerly with the Western Electric Company, has accepted the position of manager of the Eastern office of the *Western Electrician*, our new Chicago contemporary. Mr. Armstrong is a capable and deserving young man, worthy of full confidence, and the *Western Electrician* is to be congratulated on securing him. His headquarters will be at 181 Broadway.

The Commissioner of Patents is hearing arguments this week upon the petition of Prof. Elisha Gray for permission to amend his original application for patent to an electric telephone, filed Oct. 29, 1877, by inserting therein the word "metallic," so as to make the claim specifically for a metallic diaphragm. Should this petition be granted a new interference will be declared, thus reopening the original telephone question.

The dynamic value of a pound of good steam coal has been estimated by Prof. W. D. Rodgers as equivalent to the work of one man one day, while three tons would represent his work for 12 years, counting 300 working days in a year. He has further estimated that a four-foot seam would yield one ton of good coal to the square yard, and that one square mile in area would represent the labor of over 1,000,000 men for 20 years.

Through a typographical error we have caused Prof. Charles R. Cross to make a statement which is very wide from that gentleman's belief. In our last issue, at the bottom of the second column on the fifth page, the sentence should read, "Thus going to prove that a make and break circuit cannot *alone* be used in transmitting speech."

We would refer the editor of a certain western newspaper, whose sentiments we recently quoted, to the following editorial taken from the New York *Tribune*, November 20: "The use of electricity as a means of lighting the city at night has passed beyond the experimental stage. It is in every way more useful and satisfactory than any other method. From all those parts of the town over which its splendid glow is cast street crimes have been driven almost entirely away. A distinguished police authority in another city has said that he considered an electric light almost equal to a policeman in the respect criminals pay to its presence, and certainly the experience of New York supports this opinion. The brilliant arc lights along Fifth avenue afford street passengers an ample protection, and it would be a distinct gain in this respect if it were possible to surround the ferries and the thickly populated districts down-town with just such a blaze of light."

Wonderful results are promised for a monster magnet made of two Rodman guns, which are connected at the breech. Around them is wound about twenty miles of submarine cable. The cable is some that has been used in the torpedo service. It is wound and fastened in a substantial manner, making a powerful electro-magnet when electricity is applied, that shows strange results. For instance, a bar of railroad iron thirty feet long, if placed in the open cannon's mouth, cannot be drawn out by all the many men that can grasp it. Another instance of the strength of this big magnet was illustrated with a 350 pound cannon ball. The shot was placed in the mouth of one of the cannons, the negative side of the magnet. On reversing the electric current it fell from its position, but was attracted to the opposite cannon and clung to its side. The positive current was then reversed alternately with the negative, and the heavy cannon ball played between the two cannons like a tack between the poles of a toy magnet. Before many days there will be a public exhibition of this attractive magnet, in which leading army engineers are interested.

IMPORTANT MEETING OF CARBON MEN.

A meeting of carbon manufacturers is being held in Cleveland, Ohio, this week, comprising all the leading manufacturers except the Brush Company. The meeting is called, we are informed, to secure a union of the interests represented in defending a test suit brought by the Brush Company against the Faraday Company for infringement of patents. The Faraday, the Thomson-Houston, the Standard, the National, the Parker-Russell and other companies are expected to be represented at the meeting.

AN ELECTRIC BURGLAR ALARM TO THE RESCUE.

All the rich people in that region of riches up on Fifth avenue around and about the great cathedral and the Vanderbilt houses congratulated themselves particularly last Saturday. They congratulated one another, and then they wished they knew the man who invented burglar alarms, so that they might shake his hand, too. These felicitations all came because of a little occurrence on Fifty-third street, near Fifth avenue, in the very first hour of Saturday morning. When the rich people remembered that the little occurrence might have been a real big one they congratulated themselves again because it wasn't. The electric burglar alarm in the residence of Mr. M. S. Bromley, which had been placed in there by Messrs. Hazazer & Stanley, of this city, sounded an alarm about one o'clock in the night, arousing Mr. Bromley and his servants, with the result that a burglar who had entered the house was captured, and now lies in jail under $5,000 bail bonds. The burglar alarm and its prompt warning was all that saved the residence from being thoroughly cleaned of valuables.

OUR CHICAGO LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

The fire worshipers' journals all around the country are commenting in no very gentle terms, on the attempted utilization of telephones and telephone systems as fire alarms. The telephone has a mission in this world and it is filling it, but it is asking too much when we press it into service as a fire alarm. The trouble is not with the transmitter, nor yet with the receiver; and the poor girl at the Central is as free as an angel in the "high blue" from blame of any sort. The trouble lies with the crazy individual who suddenly discovers a fire on the premises, and is utterly bereft of reason—upset completely, so far as his capacity to handle a telephone is concerned. He rings up, talks before, after and while the connection is being made—yells like a wild man, and probably swears some. Not one of a dozen words reaches the operator, or anybody else. He hangs up his telephone, goes to throwing pictures, crockery and glassware out of the windows, and carries boots, rugs, and oil cloths down stairs; or perhaps turns his attention to stripping the paper off the walls, all of which sane performances may be verified by the mere asking of any fireman.

Several times within the past two years these failures to make the telephone subserve the purpose of a fire alarm have resulted disastrously in enterprising Western towns. If the man who sends in the alarm would do his part of the work as faithfully as the much-abused telephone, in all cases where there is fair service, the boys would get there on time.

"But," as the Kentuckian said about the water, when offered to quench his thirst, "I know water has its uses, though I prefer something a little more positive for a reliable drink, and my throat don't need washing."

The telephone suits in Indiana are on the increase. The Cushman Company seems to have been the most successful of any system that came in as a substitute for the bell. This batch of suits is aimed at the users of this system at Elkhart. The parties named are: James Dodge, D. Carpenter, F. A. Bendam, S. W. Shumard, Henry C. Dodge, William C. Miller, William Cornell, Herman Boneman, George Dall, F. B. Pratt, George B. Pratt, William B. Pratt, James R. Beardsley, W. S. Pancost, and Mrs. Frances Davenport.

The Board of Trade of Chicago has finally adopted what ought long ago to have seemed the most feasible way of defeating the theft of dispatches sent over their market wires. The ordinary dot and dash alphabet may, with a telephone, be read by induction, without even touching the wire conveying the messages. This is the most simple and undoubtedly the most general method of theft. It makes no noise outside the instrument itself, and the connection can be manipulated so as almost certainly to defy detection.

But the ticker knocks the telephone entirely out of the ring. A succession of make and break impulses like the rattle of the Central office ringer, when girlie can't raise the other fellow for whom you are listening. The man don't live who can read it, any more than you could a House or a Hughes telegram by listening to the clatter with your back to the instrument. There is no chance to tap the line, and carry a wire to a Morse relay—you would get only a buzz for your pains.

The Criminal Grand Jury has double-shotted its guns, and will, under command of Commodore Judge Baker, pour in a hot cannonade upon the bucket shops under the recently enacted laws bearing on the case. After defining the nature of a "bucket shop," and stating that the penalty in the first offense shall be a fine of $200 to $500, and a second conviction shall be punished by a fine and six months' imprisonment, and that the law made it binding on the Judge of the Criminal Court of Cook county to draw the attention of each succeeding grand jury to the provisions of the act, Judge Baker then continued:

It is the province and duty of courts to execute the laws as they find them, not to alter or amend them, and the public good requires that, when guilt is clear, punishment should be certain. It is usual, but not necessary, that before a case is brought before your body there should be a preliminary investigation before a magistrate, and a commitment, a holding to bail, to await your action.

In cases where a violation of the law is directed against and affects the public generally or a large number of persons alike, it can scarcely be expected that any one person will make complaint to a magistrate, and as such it may well become the duty of the grand jury to institute and carry on an inquiry.

Considerations like these, gentlemen, should be an incentive to us in our present capacities to investigate every species of offense and violation of law, to protect those who have suffered, and to punish the aggressors, so that the weak, the poor, the ignorant, and the oppressed may be led to come here to seek redress from their wrongs, no matter how numerous, wealthy, powerful or well organized may be the wrong-doers by whose unlawful acts they have been wronged or oppressed.

After the jury had retired, State's Attorney Grinnell said that he intended to commence a vigorous prosecution against the bucket-shops, conducted under the law recently passed at Springfield. He said that as far as he knew, only five or six "bucket-shops" would be proceeded against in the present instance. Mr. Grinnell declared seriously that the Board of Trade was in no manner responsible for the prosecution; neither had the Citizens' Association anything to do with it. The proof in the cases, he said, came "ready to his hands."

Ole Olesen (the equivalent in Sweden for John Smith in English-speaking countries) resides everywhere in general, but at Eau Claire, Wisconsin, in particular. Ole is an honest, hard-working man, in charge of an electric light plant which is run by water-power. Ole felt that it would be an advantage to make the shutting down as nearly automatic as possible, and this is how he does it. Attached to the water gate is a cord long enough to reach over a pulley, down to the dynamo. Firmly attached to the lower end of this cord is an iron weight, not quite heavy enough to hold the gate open. As soon as the dynamo is up to full speed he places the weight on the dynamo, and the magnetism, added to the weight of the iron, holds the gate up. When shutting-down time comes, Ole is in a distant part of the city. That makes no difference. He opens the circuit, the magnet lets go of the weight, the gate shuts, and the story is told.

This is another of those cases, mentioned by Fletcher, where "God furnished the power and the engineer didn't come from Chicago."

On the 25th of November the stockholders of the Westinghouse Company, at Pittsburgh, ratified the engagements recently entered into with other electric light companies, forming the grand consolidation. This, according to the electrical editor of the press dispatches, virtually wipes out all the other incandescent fellows, and gives the consolidated company a monopoly of the incandescent business. How like the remarks of that hero of Monte Cristo, who, as the poet has it:

> "On that lone rock, scant clothed in rags,
> All drenched in brine,
> He shouts to heaven in thunder tones:
> 'The world is mine!'"

A rural gentleman in Buffalo, according to the *Express*, undertook to explain the police telephone sentry box on the street corner. He said that in former days, when any one wanted to find a policeman he never knew where to look for him. Now the matter was simplified. There was an officer in the box, and when one was wanted he could always be found. This feature of the police telephone and signal company's apparatus is not protected by patent—everything else that is valuable in the system is so covered.

The Valparaiso Gas Company is another convert to electric lighting. The Western Electric Company has just closed a contract with the Valparaiso Gas Company for a plant of seventy-five lamps—twenty-six for street lighting and the other forty-nine for depots, stores, etc.

Chicago streets are pretty well plowed up by the various electric people, and by the street railway folks also. The placing of a cable on the north side, with a loop terminal through the La Salle street tunnel, has been making considerable inconvenience to the public generally, which is very patiently borne because of the better condition of things which we are all to have soon. There are some electrical appliances which are to aid in the control of the cable movements. An insulated number fourteen copper kerite covered wire will run the entire length of the cable line, and between the engine houses. A register and gong will be placed within the hearing of the engineer, and at each man-hole a numbered signal box will be placed, for use in case of accident. All this will be underground—and at any man-hole a conductor will only need to open the cover and reach the crank, to stop the engine and notify the emergency gang to immediately answer the call for help; the number of which, as in a fire alarm system, indicates the locality. A double-contact balanced relay will automatically indicate a break in the circuit.

The National Electric Construction Company, of Chicago, are doing the above work for the Cable Company.

At the regular meeting of the Electric Club, on the 21st instant, Mr. Haskins, of the entertainment committee, reported that Mr. Van Depoele had been unable to prepare his promised paper on Electric Railways, and that, for want of something better, he would volunteer a paper on "Coupling Dynamos on the Same External Circuit."

The paper was prepared, as the reader stated, "because it is my wish to supply the place which a better paper was expected to fill and was unavoidably postponed, and in the hope of eliciting a discussion on the subject of coupling up dynamos for electric lighting and power."

The paper was mostly made up from a recent German work, and was illustrated by diagrammatic sketches of shunt-wound and compound-wound dynamos coupled in parallel. A portion of the paper also was devoted to the coupling up in multiple arc of alternate current generators.

The discussion was quite general, and was led off by Prof. Badt, of the United States Company, and continued by Mr. Cutter, of the T.-H., Chas. J. Van Depoele, and others. The impression seeming to gain ground that Mr. Haskins endorsed the circuits presented, he reiterated his statement that his sole object in the whole matter was to get up a discussion. He did not agree with the makers of the circuits he had shown. The German baron's practical knowledge of circuits was quite severely—albeit good-naturedly—criticized.

Visitors at the club during the week have been: Secretary Crandall, of the M. and K. telephone, Kansas City; Messrs. Candee and Wetmore, of the Okonite Co., besides several local parties, more or less interested in electrical matters. Nearly every one who becomes a guest of the club signs an application for membership before he is through with his first toothpick. The total membership, to date of last meeting, was 131 resident and 46 non-resident, making a total of 177 members. Pursuant to legal notice by E. P. Warner, the constitution was amended at the last meeting, to allow the making of election of honorary members, who shall be exempt from dues, but enjoy all other club privileges save voting and holding office.

While it is quite generally understood among electric light people that but a very small amount of residual magnetism is required to prime a dynamo, it has not, until quite recently, come to the knowledge of most of us that the amount was so minute as it seemed to be in a generator which was told of at the Chicago Club, one day last week. A dynamo that had gone several hundred miles from home was set up, but refused to work. The electrician telegraphed back to the factory:

"Dynamo ruined by crossing the magnetic meridian. What shall I do?"

CHICAGO, Nov. 28, 1887.

OUR KANSAS CITY LETTER.

(From a Special Correspondent of the ELECTRICAL REVIEW.)

The Winfield Gas Company has made a proposition to the city council of Winfield that, in consideration of releasing the city from paying for certain street gas lights for three years, amounting to about $1,000 a year, the gas company shall have all the contracts hereafter let by the city for electric street lighting during the three years' term. The gas company is to file within ten days a bond with the city clerk that it will, within the time granted it in its franchise last May, have its electric light plant in and ready to supply the city with all the electric lights it requires.

It is authoritatively stated that Mr. A. R. Ford, of Kansas City, Kas., has invented an electric fish line, which kills the fish the instant it touches the hook and rings a bell on the shore to wake up the fisherman. It is also stated that the inventor is at work on an electric contrivance by which the exact weight of the fish can be determined, which in effect will do away with the chestnutty exaggerations as to the actual weight of the fish.

Fort & Wayland, of Moberly, Mo., met with an expensive break at their electric light plant the other night, through the carelessness of Ed. Doyle, machinist in charge. When he started up for work, he neglected to open the cylinder cocks for the escape of condensed steam. The result was that at the first revolution the fine Westinghouse engine, which was capable of making the dynamos hum at 1,200 an hour, was torn to scrap iron condition. Doyle waited not on the order of going, but decamped instantly, without calling for pay due. New parts for the engine main base and cylinders have been ordered. In the meantime, only a few of the users of electric light will be discommoded, enough who have gas having volunteered to be cut out until the repairs are made, which will be completed in ten days.

James R. Strugnell, an expert electrician of Philadelphia, Pa., is in Arkansas City, Kas., superintending the setting of the dynamos and placing the wires for the electric light company. He will complete his work in about ten days.

The De Mier electric car signals are being tested on the New Mexico railroads.

It has been reported heretofore that the Jefferson City (Mo.) Gas Company had bought the electric light company. J. C. Fisher, Esq., of Jefferson City, president of the electric light company, being asked if the company had sold out to the gas people, replied:

"No, but negotiations have been pending for some time looking to the organization of a new company, with not less than $100,000 capital, having for its object the purchase of both the gas company and the electric light company, and the expenditure of at least $25,000 at once in the enlargement of both works."

This consolidation has now been accomplished, the new organization incorporating under the name of "The Jefferson City Light, Heat and Power Company." The capital stock of the new company is $100,000, paid up, and divided into 1,000 shares of the par value of $100, the shares being held as follows; James Nelson, of Boonville, 64; Otto Monnig, of Hermann, 120; Mrs. Caroline V. Price, of Jefferson City, 288; E. Haas, 96; Jacob C. Fisher, 51; H. C. Giesberg, 40; W. W. Wagner, 149; Louis Schmidt, 48; Mrs. Mary H. Price, of Kansas City, 144. The directors of the company for the first year are Charles E. Hass, W. W. Wagner, H. C. Giesberg, J. C. Fisher and Louis Schmidt.

Hannibal, Mo., has been agitated by the question of incandescent lights for a long time and was willing to do a great deal for the company that would furnish them. Prompt action on the part of some individual or company may secure these privileges yet, but unless it is quick and decisive the plan outlined by "Citizen" will catch Hannibal.

Kansas City, Mo., Nov. 21, 1887.

OUR OMAHA LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

The electric light was given a great boom in this city the other night, when the gas supply became exhausted.

The greater part of the city was in complete darkness, and tallow candles were in great demand. The streets away from the business centers were clouded with darkness, and timid people kept indoors. At the Millard hotel all the outside electric lights were turned inside, and the house was in comparatively good shape. Candles were necessary for use in the guest chambers at all of the hotels in the city, and some of them found great difficulty in securing candles in sufficient quantities. The guests, and especially the commercial men, seemed to enjoy the novelty of tallow dips, and with beer bottles—empty, of course—might be seen marching off proudly to bed.

Boyd's Opera House was closed, and the performance of the German Theater did not take place. Electric lights were put in ready for the following night's performance.

The work of setting poles, stringing wires and putting in machinery for the new incandescent light plant at Lincoln, Neb., is progressing satisfactorily, and on the first of the coming month the company will begin giving its patrons lighting in any desired quantity, and at any time of the day or night. The company occupy the entire basement of the Masonic Temple. At the rear is a battery of five boilers, each of 100 horse power. This is said to be the finest set of boilers in Nebraska. Three powerful engines—two of 100 and one of 150 horse power—move the machinery that generates the electricity. There are two dynamos for the incandescent system, with combined power enough to run 2,600 lamps. The six dynamos belonging to the old arc plant will be brought to the new quarters, and propelled by the new engines. The old house, with engines and boilers, will be sold to some manufacturing company. It is hoped to have the new works completed and ready for business in about ten days, although regular service will not begin until the first of December. One thousand lamps have already been put in, and another thousand will probably be in place before the plant is ready for business. The company has already expended $37,000 this year, and when the system is complete the property will be valued at $80,000.

The electric light system, which will soon illuminate the streets of Council Bluffs, Ia., across the river, and which will prove such a benefit to the city, was the original idea of ex-Mayor W. R. Vaughan, who took the initiative steps during the term of his mayoralty of the city, and to him more than to any other one person the credit of the system in that city belongs. The organization afterwards fell into the hands of Mr. Officer and others, who have carried out the original design of Judge Vaughan.

Omaha is displaying quite an interest in electrical matters, and there is talk of an electrical club. No new buildings go up in the city now without complete arrangements for electric lighting, electric signals, etc. A great advance in electrical matters is noticed all over Nebraska, and you may expect to hear from me often hereafter.

The Midland Electric Company is doing a rushing business, and is backed by energetic men.

Telephone matters are quiet. Good service is given by the company controlling the business in this State.

INCA.

OMAHA, Neb., Nov. 24.

—— The Schuyler Electric Light station at Newark, N. J., was nearly destroyed by fire last Sunday. The loss on buildings, engines and dynamos is about $4,000.

—— A new electric light company has been organized at Belvidere, N. J., to operate the Mutal Electric Manufacturing Company's system. Forty arc lights will be used at the commencement.

Telephonic News

⁂ The new telephone building on Cortlandt street, New York, is a popular place for electric offices. The telephone, electric light, wire manufactories and engine companies are well represented.

⁂ The citizens of Worcester, Mass., are objecting to the use of poles by the telephone and electric light companies. Still, people want telephones and the electric light, and these wants should be supplied.

⁂ The Edison Phonograph Company, with E. T. Gilliland at its head, has established New York headquarters at 19 Dey street. A large number of phonographs are now in course of manufacture, and before many moons the phonograph business will be well under way.

⁂ The telephone interests of Southwestern Kansas are well looked after by manager H. G. Chipchase, of Wellington. His earnest efforts have won quite a degree of popularity for the telephone, and also won him a bride; his marriage to Miss Fannie Cochrane, of Caldwell, having been recently announced.

⁂ The Police Commissioners of Charleston, S. C., recommend the introduction by council of a police telephone and signal service similar to those used in many of the large cities at the North. Such a service, it was stated in the report, could be introduced at an outlay of from $10,000 to $12,000, and would greatly improve the efficiency of the police force.

⁂ The American Electrical Works, Providence, have experienced the deserved fate of first-class manufacturers of the best grades of wire, and are kept busy night and day, endeavoring to supply customers. The convenient New York offices of this company, at 18 Cortlandt street, presided over by Mr. P. C. Ackerman, are receiving a large share of the business in this branch of the work.

⁂ J. S. Parkham, who resides near Guthrie, Tenn., speaks of a phenomenon, which he thinks was an electric current in the atmosphere He says that while driving to church on Sunday he felt a shock, something as if from a galvanic battery, and heard a popping noise in the air. Presently his son observed that the hairs of the horses were turned up the wrong way, like the hairs on the back of a mad cat, and spread out like a turkey's tail. He tried to smooth the hairs down with his hand, when they popped like parlor matches.

⁂ A strange phenomenon startled the operators in the Central telephone exchange during a heavy snowstorm one day last week. Simultaneously, every drop on every switchboard fell, and the half dozen lady operators, all of whom had received a severe shock, snatched the fixed telephones from their heads and ran screaming into an adjoining room. Two of them were prostrated by the shock. There were no signs of lightning, and the disturbance was caused by free electricity in the atmosphere. Manager Sailor says he has had but one such experience before, and that was in 1879, at Toledo.

⁂ A Birmingham paper says that a novel experiment was tried there last week with the telephone. A letter was received by Messrs. Rogers and Priestly, musical caterers in that town, asking them to send an organ to suit a pianoforte to a room at Moseley, where a concert was to take place that night. The firm were totally at a loss to know the precise tone of the piano, and consequently despaired of being able to comply with the demand in time. However, much to their surprise, they found that they could communicate with the people at Moseley through the telephone. Forthwith Messrs. Rogers asked that one of the notes of the piano should be struck. When this was done the sound could be distinctly heard in Colmore Row, and by gradually reducing the pitch pipe the tones of both instruments were made to correspond.—*The Electrician, London.*

Train Telegraphy.

WILKES BARRE, Pa., Nov. 18, 1887.

To the Editor of Electrical Review:

The papers I ordered were received, but there are yet two questions in the system of moving train telegraphy that I would like you to explain:

1st. There are generally several wires on a pole; how can the train operator distinguish a certain wire?

2nd. During a thunder storm, is the train operator safe from the effects of lightning if the receiving telephone is kept to the ear?

If you will publish the answers in your paper, you will greatly oblige

A YOUNG INSPECTOR.

Answer.—1st. Musical vibrations are transmitted over the wire or wires used—a particular pitch, that of the key of A, may be used for instance.

2nd. Yes. The rails constitute a perfect lightning arrester. Who ever heard of a railway train being struck by lightning?

The Gentle Operator Never Smiled.

As I stood by, giving a telegram to the young woman employed as operator in one of the great hotels at a noted summer resort, I wondered what must be the state of mind of this class of workers at the end of a day's labor. While I stood beside the little ticking machine, waiting my turn to be served, the proprietor came up and wrote on a blank the following legend, which the patient operator read aloud very carefully and distinctly: "There is no goats in M." No smile stole over her impassive countenance. She showed no sign of curiosity to know the sequel or preface to this quaint message. She made no corrections of grammar, but simply ticked off the letters contained in the six words. Whether that perfect self-control was the result of long schooling or the indifference born of knowing a little of everybody's business who sent a message over her wire, I know not. I could but admire her self-control while I wondered still what could be the objection to such innocent, inoffensive animals as goats. My curiosity was rewarded the next day when there arrived a crate containing the familiar form of a Nannie goat, looking for all the world like every other goat of her sex, very bewildered and awkward, and not very happy at being transported to this goatless town. When, soon after, a lady, nurse and baby followed the goat, the whole mystery was unraveled. Perhaps I shall get intimate enough with that lady to know how that telegram read when it reached her.

The Use of Electricity for Treating Gold and Silver Ores.

On September 16th, we mentioned that a new process of dealing with silver ore, which involved the use of dynamos, was being taken up in Nevada. We now learn that the method, which is due to Mr. Molloy, of the Hydrogen-Amalgam Company, consists in placing ground ore in a flat pan containing mercury and water; in the center of the pan is a porous pot which contains a lead plate in a solution of sulphate of soda. An annular disk surrounds the porous pot and floats upon the surface of the mercury. The material of which this disk is made is not stated; it is, however, caused to rotate very rapidly, so as to effect an intimate mixture of the ore with the mercury. The whole of the mixed materials are thus "urged out at the rim of the disk by centrifugal force" Meanwhile, it should be stated that the lead plate in the porous pot is connected with the positive terminal of the dynamo, and the mercury in the pan with the negative terminal. Hydrogen is thus evolved upon the surface of the mercury from the water in the pan, and thus overcomes the tendency to oxydize, or "sicken," as the workmen call it. It is claimed that as much as 40 per cent. more gold can be extracted in this way, and as, in addition to this, the waste of mercury by oxydization is almost entirely obviated, it is clear that the process, if this be true, is one of great practical value. We are, however, under the impression that something very similar has been tried before, though, for some reason or other, no ultimate success was obtained.

A Telephone Company Restrains the Electric Light Company from Using Its Poles, Approaches, and Crossing Its Wires.

The Great Southern Telephone and Telegraph Company, of New Orleans, has filed a suit in the civil district court against the Southwestern Brush Electric Light and Power Company, for an injunction restraining the defendant company from hereafter running any of their wires within a distance of at least four feet from any of petitioner's wires; from attaching or affixing any of their wires to or upon any of the petitioner's poles cross-arms or fixtures; from running any of their wires within a distance of three feet from any of petitioner's poles, and from crossing any of petitioner's wires without necessity, and then only upon proper and additional insulation, and for judgment commanding the Southwestern Brush Electric Light and Power Company to remove all of its wires and fixtures from petitioner's poles and property.

Deep Sea Sounding in Connection with Submarine Telegraphy.

EASTERN TELEGRAPH COMPANY,
WINCHESTER HOUSE, OLD BROAD STREET,
LONDON, Nov. 10, 1887.

To the Editor of Electrical Review:

I have just attended a meeting of the Society of Telegraph Engineers and Electricians, at the Institute of Civil Engineers, Westminster. After the announcement of the names of candidates for admission to the society, and of the accessions which had been made to the Ronalds Library in the possession of the society, during the recess, Mr. Stallybrass read a paper on "Deep Sea Sounding in Connection With Submarine Telegraphy." After giving a short history of the progress of sounding the seas, commencing with the eighteenth century, Mr. Stallybrass dwelt with considerable emphasis upon the labors of Commander Ross in the Arctic expedition of 1818, and the surveying ships of the British and United States governments. He pointed out the great stimulus which had been given to this department of inquiry by the spread of submarine telegraphy, and the great bearing and importance which telegraph engineers attached to the accurate delineation of the sea bottom on which a telegraph cable had to be laid. He went on to point out the fallacious conclusions which might be drawn from deficiency in the number of soundings taken over any projected route, and gave instances of the great expense of time and labor which had resulted in cases where insufficient attention had been directed to this matter—expense which would have been very materially saved if a more accurate, searching and prolonged survey had been originally carried out over the projected line. He showed the great advance that had been made in 1872, when Sir William Thomson successfully applied steel pianoforte wire to the purpose, by taking a practical sounding in the Bay of Biscay, in 2,700 fathoms, from the stern of his yacht, the "Lalla Rookh," and how speedily the plan of using wire had been taken up by the telegraph companies and the U. S. navy compared with the British navy. He pointed out that though the British steamship "Challenger" had done much service in her surveying work, all her soundings had been taken with a hempen line; yet, whereas the "Challenger" had employed in deep water a sinker weighing four cwts., its rate of descent to a depth of 2,500 fathoms was lower than that of the wire machine with a sinker weighing only fifty pounds. He also mentioned that a U. S. vessel engaged in sounding had taken more soundings than any other ship in one cruise.

Mr. Stallybrass dwelt at some length on the form of apparatus which were in use for disengaging the sinker at the bottom, for bringing specimens of the bottom to the surface, and the machinery in most general use for effecting the winding in of the wire. He alluded, among others, with some eulogium, to the machine of Captain Sigsbee, U. S. N., for this purpose, and concluded by giving a general account of a sounding expedition of the Silvertown Telegraph Company, in which he had himself taken part.

Captain Wharton, R. N., hydrographer to the Admiralty, entered the discussion at the invitation of the president, Sir Charles Bright. He pointed out that in the case of the "Challenger" as hers was not a sounding expedition only, but one in which a number of scientific objects were kept in view, delicate instruments had to be lowered to the sea bottom, and that for the certainty of their recovery hemp was much more trustworthy than steel. He showed that to the best interests of the nation and its commerce, the ships at his disposal engaged in surveying were principally occupied in the neighborhood of land, shoal waters, and unexplored dangers, but that at that moment a vessel was in commission to take a number of deep sea soundings in the Indian Ocean, the Pacific, and elsewhere—parts of the seas that had not yet received their due share of exploration, while deep sea soundings were taken from time to time. Also that wire for sounding had been largely introduced into the navy, and that they found it useful to galvanize it to protect its surface from corrosion.

Mr. Buchanan, who had taken part in the "Challenger" expedition, also dwelt upon the importance of finding a bottom of ooze, or mud, for a cable to rest upon; for he showed that evidence of rock indicated not only that the bed was a hard one, but that, owing to the conformation of that rock, or more probably to continual currents, ooze was unable to find a resting place there, in either case a bad symptom for the durability of a cable at that spot. Further, that in the case of rock at great depths it was generally volcanic, and as such abrupt in form, so that once knowing its position, a little care would enable a cable to be laid in a safe detour round it. Also, that where coral was met with, and there was not only the coral of shallow and warm water, but the coral of great and colder depths, the formation of the reefs was generally of similar abruptness and consequent facility in avoiding.

The discussion was continued by Mr. Charles Bright, and closed by the president, Sir Charles Bright, with appropriate remarks, and a general vote of thanks to Mr. Stallybrass. A. E. KENNELLY.

Work on Subways.

OVER ONE HUNDRED AND SEVENTY MILES OF DUCTS COMPLETED—WHERE THE LINES RUN.

The *Tribune* says that considering the difficulties with which the construction company had to contend, the novel character of the work, dissensions in the Board of Electrical Control, delay in obtaining permits and various other matters that need not be mentioned here, the results of the summer's work are creditable to the company's energy and enterprise. A brief review of what has been accomplished, and what is still under way, will prove that this statement is well founded and strictly true.

THE CONDUIT UP FIFTH AVE.

The first work done last spring was on the west side of Fifth ave., where a subway was laid from Fourteenth to Forty-second streets. This was designed to accommodate electric light wires generally, with a separate system on top for the wires of the Edison Electric Light Company. It consists of iron ducts two and one-half inches in diameter, and varying in number from a dozen at the upper end, where the demand for service is light, to about fifty in the region of Twenty-third street. These pipes or ducts are all laid in hydraulic cement.

The next work began in Broadway at Forty-second street. From this point an underground conduit was laid down Broadway on the east side to Fourteenth street, with lateral branches running through several cross streets to connect on the west side with the subways in Sixth avenue. On the east side, these branches extended as far as Madison, and in one instance, at Twenty-third

street, to Fourth avenue. The work in this section has all been completed; the telegraph, telephone and electric light companies operating in it have been ordered to take down their poles and wires, and this order will be complied with by December 15th, or New Year's at the latest. There is no disposition on the part of any company to delay matters, so far as the construction company or the Board of Electrical Control at present are aware.

In Sixth avenue another subway was laid on the west side of the thoroughfare, parallel to that put down last summer, the material of which was furnished by the Dorsett Company. This extra one in Sixth avenue is for the accommodation of electric light wires, the other subway being entirely devoted to telephone and telegraph service.

The underground conduit in Fifty-eighth st., which was the next put down, extends from Third to Tenth aves., and has already been put into use in an experimental way. All the subways, in fact, are fully tested before the overhead service near them is disturbed. The Metropolitan Telephone Company has had its cables in the Dorsett conduits in Sixth avenue for nearly a year. It claims to be still testing them, but as no serious complaint as to the working of the cables has been made, the company has been informed that the payment of rent is now in order.

The greatest difficulties in the work of construction were naturally encountered down town. For example, the big subway running from Cortlandt street up Broadway and through Park Row to the Bridge, which carries the Western Union Telegraph Company's cables to the Third avenue elevated railway structure, and also receives the wires coming over the Bridge, was built mostly at night. So was the conduit in New Church street, which is the beginning of the west side trunk line. Everything had to be done so as to avoid obstructing the great stream of traffic that surges through these streets during business hours. Even the dirt was carted away down to the foot of Whitehall street, and left there until it was needed to fill in again. This subway in Broadway is being extended down from Cortlandt street to the Battery, with branches to the Stock, Cotton and Produce Exchanges and any other business centers that may require them. Last week work was begun on another subway in Spring street, to accommodate the wires of the Metropolitan Telephone Company, which has an exchange there near Breadway, and also the wires of the Baltimore and Ohio Telegraph Company's office at Broadway and Canal street. It will connect at Broadway with the subway already built there, extending from this point in a westerly direction to the North River, with branches running down Green street and up Macdougal street. This is the first conduit built under the Averill system, which, it is claimed, can be laid at the rate of 1,100 feet a day. In addition to these the company is working with all possible speed to finish the subway of creosoted wood which runs through Sixth avenue, from Twenty-first street, where the subway to Fifty-eighth street begins, down Carmine street, through Third street and South Fifth avenue to Spring Street, where it will connect with the one already finished or practically so, which runs from State street up through Church and Green, thus forming a trunk line on the west side from the Battery to the Park.

The central trunk line, that in Broadway, has, as stated, been completed from Fourteenth to Forty-second streets, and nearly so from the Post Office to the Battery, but nothing has been or will be done this year on the east side main line.

Whether these underground conduits should be insulated or not is a disputed question among electrical experts. The Board of Electrical Control and the construction company are not sure which is right, but they propose to find out by practical experiment which is the better system, and they have for this reason given the advocates of both sides a chance. On the west side an insulated conduit, cement, creosoted wood and pitch tar, has been laid, while in Broadway iron pipes, non-insulating material, have been used entirely. Some of these pipes have been laid bare in the hydraulic cement, while those put down last have been treated to prevent oxydization. About 170 miles of all kinds have been laid thus far this year. To do this has required an outlay of $2,000,000 on the part of the construction company, which has not yet received a dollar in the way of rent. It is probable that $4,000,000 or $5,000,000 more will have to be expended before the entire underground system is completed, but of course some returns will begin to come in long before that. From 1,200 to 1,500 men are employed by the contractor, John D. Crimmins, most of the time, and as many as 2,000 have been at work at certain times.

THE QUESTION OF TEARING UP THE STREETS.

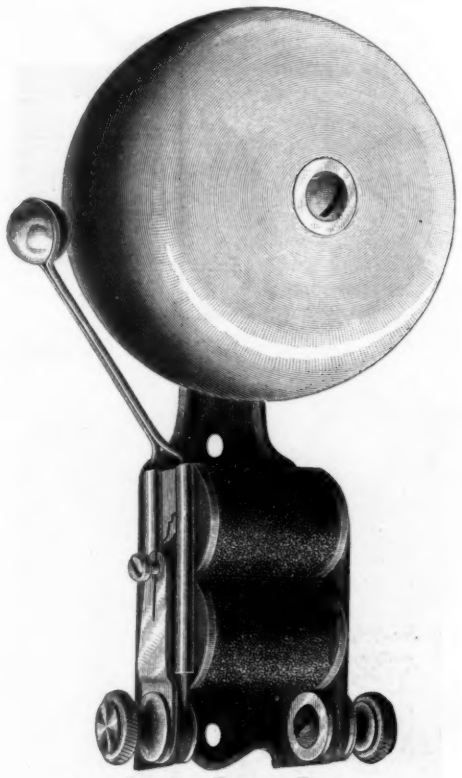
A great deal of criticism has been made upon the construction company for tearing up so much of the streets at one time in its efforts to push the work as rapidly as possible. Some of this criticism has been well founded, but a good deal of it has been unjust, according to the officials of the company. Said one of these yesterday: "We have to a great extent been blamed for work that did not belong to us at all. During last summer the new Standard Gas Company was tearing up the streets everywhere to parallel with its pipes those of half a dozen of the old companies. Yet scarcely a word was said about this work, unless to say that it was our work. Then the Steam Company was tearing things up as usual, but whenever attention was called to it, nine times out of ten we were blamed for the obstructions made by this company's employes. As a matter of fact, the New York public was never less inconvenienced by any great work than it has been by this subway contract. Mr. Crimmins was ordered to spare no expense in doing the work so as not to interfere with traffic in the streets, and he has heeded this injunction. He does the work, you know, and then renders us a bill for what he spends, on which he is allowed a certain per cent. for profit. Hence it is nothing to him how much the subways cost. Why, that subway in Park Row was really completed before anything was known about it by lots of the business men along that thoroughfare. The work was done mostly at night and every bit of dirt carted away. It cost lots of money to do it, but President Lauterbach's orders were to spare no expense."

"The electrical wire companies are all satisfied now that the underground system is superior to the overhead, are they not?"

"Oh, yes, entirely so; at least, so far as I know. The work is being done in a manner approved of by them, and they will all be glad to take their wires down as soon as we get subways ready for them. The telephone companies will be especially pleased. Why? Because under the present arrangement the cost of maintaining their wires yearly equals the first cost of construction. With the subways the cost of maintenance will be comparatively nothing, and the rental will be but a trifle in comparison with the expense to the company now by winter storms. The subways that are being put down now will last a lifetime. Unlike the gas pipes and water mains, they will not make it necessary that the streets be torn up from time to time, and hence we feel justified in asking a little forbearance on the part of the public and the press when we do cause a little inconvenience in hurrying our work."

The Gem Electric Bell.

In the line of electric bells for house work there has been marked improvement the past few years. In construction, efficiency and durability, changes have been made with a view to lessening the cost and yet provide a desirable article. The Gem bell, which is being energetically pushed by Horace Van Sands, New York city, is meeting with a degree of popular favor that even surprises the manufacturers. It is a compact, neat and reliable result of careful electrical work. A view of the bell, full size, is given on this page.



THE GEM ELECTRIC BELL.

How Absorption of the Baltimore and Ohio Affects Western Union.

"The telegraph is the best barometer to indicate the commercial condition of the country that can be found," said President Norvin Green, of the Western Union Telegraph Company. "It varies directly in volume of business as trade varies, except in time of panic, when the telegraph business increases, though only to fall afterward. The charge that this company has increased its rates since the absorption of the Baltimore and Ohio line is not true. The rates to Chicago and St. Louis, which were 50 cents, are now 40 cents. To St. Paul, Minneapolis, Omaha, and that range, the rate, which was 60, is now 50. There is scarcely a Western Union rate anywhere that has been increased, except the ten-cent and fifteen-cent rates. These the other companies were handling at a loss. The Postal and United Lines have come up to our increase and are going to stand by it. I demonstrated, in fact, in my last annual report, that the average cost to us of handling a message was a little over 23 cents. On city business, for instance, from one station to another, we make nothing at all, as each message has to be relayed and requires four operators, and if sent uptown, 5 cents additional for delivery.

"The sequel of the deal shows that we have taken all the Baltimore and Ohio business, and at better rates. The Baltimore and Ohio business last year averaged $26,000 per week. Of this about three-fifths, or $21,000 or $22,000, came from the larger or test offices, which report weekly. A comparison of our revenues from the test offices for the past three weeks in this month shows $218,464, against $173 590 for the first week in November of last year; $219,300, against $169,000 for the second week, and $225,467, against $170,856 for the third week. We had an increase for the weeks just before, varying from $12,000 to $17,000. Add to the $21,000 of the Baltimore and Ohio receipts our own average increase of $16,000, and you get $37 000. This leaves about $15,000 per week as the result of advancing the non-paying rates of the Baltimore and Ohio. The estimated general increase in our business is about $75,000 per week over last year."

Dr. Green further gave the figures from the leading offices of the country, first for the first three weeks of November, 1887, and secondly for the same weeks in November, 1886. They were as follows: New York, 1887. $32,600, $30,600, and $33,700; 1886, $24,100, $25,500, $25.400. Chicago, 1887. $18,700, $17,900, $20,900; 1886, $14,700, $14,600, $14,500. Baltimore, 1887. $3,700, $4,000, $4,300; 1886, $2,400, $2,600, $2,700. Boston, 1887 $8,900, $9,600, $9 700; 1886, $6,500, $6,700, $6,800. Cincinnati, 1887. $4,700, $5,100, $5,100; 1886, $3,400, $3,400, $3,800. St. Louis, 1887. $8,600, $8,900, $9,000; 1886. $6,000, $6,000. $6,400. Kansas City 1887 $4,500. $4,700, $4,900; 1886, $2,800, $3,000, $3.100. Louisville, 1887. $2,900, $3 0 0. $3,000; 1886, $1,800, $1,800, $1,900. New Orleans, 1887. $5,800, $6,300, $5,800; 1886, $3.500, $3,600, $3 900.

"We shall be able to handle the Baltimore and Ohio business," he continued, "at a cost of 40 per cent. of its receipts, as soon as we get rid of their rentals. We have got off some and shall get rid of more on the 1st of May. We shall put in effect on Dec. 1, an extensive scale of changes to equalize rates and make them consistent with each other in different parts of the country. This we could not do during a competing fight. We shall level all those downward, however, and are leveling none upward except the ten-cent and fifteen-cent rates, which could not be maintained at those figures except at a loss. Our average rate per message was reduced last year from 31¼ cents to 30¼. This year it will be reduced below 30 cents, the reduction being made in the long rates."

.... The United States Electric Railway Signal Co., capital stock $500,000, has been incorporated at Ashland, Ky., by John H. Crook, Oscar J. Cohn and William B. Sterrett. The object of the company is to manufacture electrical appliances, etc.

.... In a petition filed in the Superior Court, Cincinnati, by Frank D. Rettich against the Western Union Telegraph Company, he alleges that in 1874 letters patent were granted to H. C. Nicholson for a quadruplex telegraph instrument, giving him the exclusive right to make, use and vend it. November 12, 1874, Nicholson assigned his right to make the instruments to Louis Holman. Holman died and bequeathed his rights in the patent to the plaintiff in this case. After the assignment to Holman of the right to make the instruments, Nicholson assigned all his right, title and interest in the patents to the Western Union Company, and stipulated that it should employ Holman to make the instruments. It is alleged that the company has been making the instruments itself, and Rettich now sues for $25 for each instrument so made and now in use by the company, and asks that it be compelled to disclose how many are now in use.

ELECTRICAL AND SCIENTIFIC

* * The American Electric Company of Baltimore has been incorporated by Thos. J. Shryock, John H. Fowler, Robt. Turner, Wm. A. Dunn, Solomon Strauss, F. P. Stevens and Wm. H. Crawford. A meeting of incorporators was held, and the following officers elected: Thomas J. Shryock, president; Wm. A. Dunn, vice-president and general manager; John H. Fowler, treasurer; C. Whiteley, secretary, and F. P. Stevens, counsel. Steps will be taken immediately to erect a complete electric light plant, both for street lighting and an incandescent system for offices, dwellings, etc. The system to be used is that of the American Electric Company, of New York.

* * A dispatch from Spokane Falls, W.T., Nov. 1st, says that Tuesday night about 10.50 o'clock, while the sky was overcast with heavy clouds and light rains were falling, a meteor was seen by a number of people to shoot from the heavens directly overhead. It struck the electric light wires on the south side of Main street, between Howard and Mill streets, in the very heart of the city, cutting one of the wires in two and bursting into thousands of fragments. Those who saw the strange phenomenon say that when it struck it had the appearance of a ball of fire which looked to be ten feet in diameter.

* * When the electric light plant was established at Asheville, N. C., about a year ago, it was considered by many as an experiment, so far as the financial success of the company was concerned. The Asheville Electric Light Company was thought by many to be making a mistake in fixing the enterprise with such extensive capacity. But one year's experience has proved the wisdom of the management, and yesterday the superintendent of the works here left for Indianapolis and other cities North, for the purpose of securing additional machinery and supplies for extending the original plant here. Another object of the superintendent's trip is to carefully inspect electric motors, for the purpose of running small machinery.

* * Mayor Babcock, of Cleveland, at the solicitation of Ex-Mayor Gardner, recently wrote to Washington asking whether or not the government would pay for telephone service at the Cleveland Life Saving Station. There is a telephone in service at the station, but it is paid for by vessel men and citizens who appreciate its value, but the rental will expire at the close of the season. The Mayor received an encouraging answer from Gen'l Superintendent Kimball, of the Life Saving Service, inquiring for particulars and the cost. The value of the telephone in the Life Saving Service was thoroughly established by the prompt aid which it brought to the wreck of the schooner Zach Chandler near Cleveland and the recent wreck of a vessel near Chicago.

* * After several months of hard work, the underground wire committee, of Detroit, have reported their findings to the council. They declare that the underground conduits in use in Chicago and other cities are not so expensive as to be impracticable; that the Edison company is successfully operating 10 miles of wires underground in Detroit. The committee finds also that to supply the half-mile circuit will require only five miles of conduit. In connection with this report, Ald. Trombly offered several resolutions. One was instructing the city clerk to personally serve a properly attested notice to go underground upon all electric light, telephone and telegraph wires. Another resolution instructs the city controller to see that the notice is enforced. Separate resolutions for each company were submitted, requiring them to place all wires within the one-mile circuit underground by July 1, 1888. The resolutions were duly received and ordered printed.

Personal.

Mr. F. A. Cheney, the handsome general manager of the Elmira Illuminating Company, was a New York visitor last week, arranging with the engine men for additional power for his new station.

Mr. E. I. Garfield, secretary of the Thomson-Houston Company, has returned from a South and West trip, much refreshed by his vacation—the first in about ten years.

Mr. Geo. F. Parmelee, president of the Edison Company at Topeka, Kansas, is in the East, investigating electrical work. His company is succeeding finely.

Messrs. L. W. Burnham, of Boston, and H. A. Cleverly, of Philadelphia, were entertained at the Hotel Lafayette, Philadelphia, by Mr. A. L. Bogart and bride. These well known electric gas lighting men had a pleasant meeting.

—— The Taylor Manufacturing Company, of Chambersburg, Pa., have recently sold the following Beck Horizontal Automatic engines for electric light service: An 18½x24 227 horse power engine, for the Thomson-Houston station at Augusta, Ga.; a 11½x15 83 horse power engine to the Wissahicken Electric Light Company, Philadelphia, Pa.; a10½x12 67 horse power engine, for the Honesdale Electric Light Company, Honesdale, Pa.; a 9½x12 57 horse power engine, for the State Industrial School, Kearney, Neb.; a 10½x12 67 horse power engine, for the Gas and Electric Light Company, Sturgis, Mich.

—— The works of the Solar Carbon Company, Pittsburgh, burned down last Friday. This is a loss of $20,000, and throws a number of men out of employment.

——John Buckley, of Meriden, caught a snapping turtle and took it to the telephone office where he works. He thought that he would kill the animal by electricity, and so put the end of a wire in front of it, and the turtle snapped at it and held on. Then Buckley put another wire under the shell and turned on the entire electric current of the office. The turtle shut his jaws tighter and closed his shell, and in five minutes was apparently as dead as Julius Cæsar, but the next morning he was walking around the office quite heartily. It had received an electric shock powerful enough to kill a man.

A Method of Making a Selenium Cell of Constant Resistance.

M. Mercadier promises shortly to explain a new system of multiple telegraphy based upon the employment of the selenium cell, of which, as is well known, he has made a special study. In the year 1881, M. Mercadier first described a method of making a low-resistance selenium cell for use as a radiophone receiver. This method consisted in taking two thin strips of brass, separated by a sheet of paper, and drawing a stick of melting selenium along the edges. It was, however, found that the selenium deposited in this way was very apt to scale or chip off, and, moreover, it was almost impossible to make two cells of this pattern which should have the same resistance. He therefore constructed a somewhat different form of cell, which, although now described (in the *Comptes Rendus*) for the first time, has yet remained unaltered in resistance for over six years, and it has also been found an easy matter to make other cells of the same resistance. A pair of platinum wires are accurately laid down in the form of a double spiral upon a sheet of emery paper. The ends of the wires

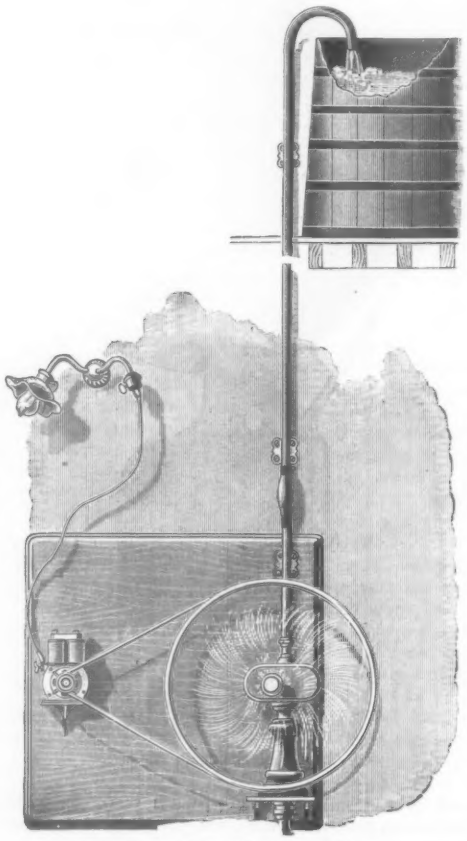


Fig. 2.—C. & C. Motor and Pump.

are attached to two separately insulated blocks of brass, upon which the emery paper rests. The whole is then heated to the melting point of selenium, and a stick of that material is drawn around the double spiral. This would scarcely seem to be a very easy mode of constructing a set of identical cells, but in M. Mercadier's hands the results obtained are excellent. Several cells made at different periods since 1881 have each a resistance of about 300,000 ohms, and have not varied since their first measurement.

—— The Citizens' Electric Railway Company of Buffalo, N. Y., has been organized with the following officers: President, A. P. Wright; vice-president, Michael Nellany; secretary, Francis F. Fargo; treasurer, Michael Nellany. From the title of the company it will be seen that electricity is the only motive power that has been considered. It is probable that the storage battery system will be adopted, or possibly the Bentley-Knight underground system, which has been experimented with in other cities.

The Industrious Gas Meter.

Oh, gas may escape, and gas may burst
And vanish in noise and flame,
But the meter's hand, in its quiet way,
Goes traveling onward, day by day,
And gets there just the same.

C. O. B.

The Topeka Tower.

The fall of the electric light tower in Topeka, Kas., rather cooled the ardor of that city to close its contract with the Brush Electric Light Company for a tower system of electric lights. President Baker, of the company, has now sent the following communication to the Topeka Council:

To the Mayor and Council.—In accordance with your request on the 11th of July, we made you a proposition to erect seven towers at such points as you might designate, and to light eight towers, four 2,000 candle power lights on each tower, for the sum of $9,000 per year for five years. In that proposition we were to have use of the tower that was then on the corner of Kansas avenue and Tenth street; since that time the tower has fallen down, not through any fault of its construction, but through its not being taken care of by its owners, the city. You accepted that proposition, since which time no further action has been had by you. We now renew the offer, agreeing to put up the eighth tower at our own expense on the same conditions that we asked for in regard to the other seven towers. We wish to say in this connection that we have been in correspondence since that time with the authorities of many cities which light their streets on the tower system. There are a large number of cities in the United States which do this, and in no town have they been discontinued, but give universal satisfaction.

F. P. Baker,
President Brush Electric Light Company.

—— Those delights of the chestnut-mongers, the tall electric light towers in Union and Madison squares, will soon cease to afford opportunity for the perpetration of the snare beginning thus: "Say, they're not going to have the electric light poles any longer." This time, however, it is not because they are long enough, but because they are too short. Experience has discovered the fact that the massing of the lights at the altitude in use, while it affords plenty of illumination within a given radius, leaves a great part of the parks in question in all the deeper shadow. Hence the commission having charge of the lighting of the city has decided to discontinue the use of the long poles and ordered in their stead 30 electric lamps, which will shine instead of the gas which formerly diffused its rays from as many lampposts of ordinary caliber. It is anticipated that the new lights will utterly dissipate the shadows which have hitherto infested the borders of the parks, and render bench spooning one of the lost arts.

—— Garden City, Kansas, is still without electric lights. The papers of that city are anxious to have an electric light system, and one makes the following suggestion: "Several propositions have been made to our people to put in an electric light plant, but the city council has not seen fit to grant any of the firms or companies seeking it a franchise on the terms they have offered. The council is composed of good business men, and we take it, without an examination of the offers made, that they have acted wisely. But Garden City is far behind the times and all its neighbors, as long as she is without an electric light system. It is a necessity, a luxury, and a matter of pride. Therefore it is due the city that the council take action itself in regard to the establishment of an electric light system here. The best terms that the city can offer any company should be published, and also whatever special inducements there may be. It occurs to the writer that inasmuch as the engines at the waterworks furnish a surplus power, some arrangements could be entered into with some electric light company which would give the city twelve or fifteen street lamps at a nominal cost, in return for giving the company the surplus power at the waterworks. The company could reap sufficient profit from the lights furnished the business houses and residences."

The Improvements in the C. & C. Motor.

We illustrate in this edition several views of the C. & C. motor, and other apparatus used with them. The one horse power incandescent motor is intended for 110 volts to run at constant speed with varying load. Starting and stopping the motor is controlled by a switch which is mounted directly on the field magnets. One feature of the C. & C. motor is the brush holder, which, by holding the brush against the commutator with spring pressure is arranged so that when the brushes are lifted a certain distance from the commutator the springs are thrown out of action and the brushes latch in that position.

All of these machines are made with interchangeable parts—which is the invariable practice of this company with all the goods manufactured, and the electrical data is all stamped on suitable blank places on the name plate. This is frequently done to a limited extent, but not, as a rule, so generally and so completely as by this company.

The arc motor is gotten up specially for safety. It is so arranged that while you can regulate the motor completely you have no power to break the circuit, and as the power of the motor is reduced by the regulator, the resistance which it presents to the main line circuit is also reduced, so that when you turn the switch towards zero power you not only reduce the counter-electromotive force which the motor is capable of generating, but you reduce its resistance until, when you reach the last contact, the motor itself forms a short circuit. The field and armature are connected in parallel, and the field is divided into a number of sections in series. The switch short-circuits these sections, thereby short-circuiting the field, and also forming a shunt around the armature.

The small motor, Fig. 3, is shown on a wall bracket for running a pump or fan. The motor is placed high up out of reach, and is controlled by a regulator similar to the one of the larger machine which is controlled by cords reaching down from a cross-arm as illustrated, which makes a very neat and compact appearing apparatus, attractive as well as efficient.

The sliding base, Fig. 4, is a convenient mounting for the motors, particularly in cases where a new belt is used, and it is necessary to tighten it from time to time.

These new and improved motors are the result of very careful and thorough work on the part of Mr. S. S. Wheeler, manager and electrician of the company. They are now being manufactured on a large scale, and the company's factory at 90 South Fifth Avenue is turning out handsome and most creditable work.

—— The Deer Park Development Company, of Los Angeles, Cal., proposes to provide water power for all railroads run by electricity, and to erect and maintain electric lighting plants in all towns where it is desired.

—— Holmes, Booth & Haydens are almost unable to keep up with their orders for the smaller copper wires—covered—the increase in incandescent electric lighting having created this great demand. There is no branch of electrical business so active as that of incandescent lighting; and the manufacturer who had a large accumulation of the finer covered wires at the beginning of the season has had his heart made happy and his pocket-book plethoric by the unprecedented demand.

—— Col. C. H. Howland, manager of the Pico Street Electric Railway, Los Angeles, Cal., states that on the electric homestead tract there was a large amount of building contracted for, but at present it was almost impossible to get enough hands to do the work. A number of new residences had been recently erected, and others will be built as soon as labor can be procured. He also stated that out on the new or proposed extension of that railway a large number of fine residences were to be erected in the near future, but that out there the people complained of the scarcity of good workmen.

—— The New York Club has contracted for an isolated Edison plant of 300 light capacity.

—— The Brush Electric Illuminating Co. has declared a quarterly dividend of two per cent., payable Dec. 1st, at Nos. 204-210 Elizabeth street, New York City.

—— The Empire City Electric Company, 15 Dey street, since getting well established in its extensive downtown headquarters, has met with most gratifying patronage. General Manager Blasdell reports the electric light trade as particularly active.

—— The Knoxville (Tenn.) Car Wheel Co. will erect an electric plant at their works.

—— The Sub-Tropical Exposition Co., Jacksonville, Florida, are negotiating for the erection of an electric light plant.

—— The Jenny Electric Light and Power Co., of Nashville, Tenn., has been incorporated by A. C. Green, W. H. Smith and others.

—— At Hoosick Falls, N. Y., Messrs. Holmes, Lock & Hurd have been granted the franchise to erect and operate an electric plant. It will be completed by January 1st.

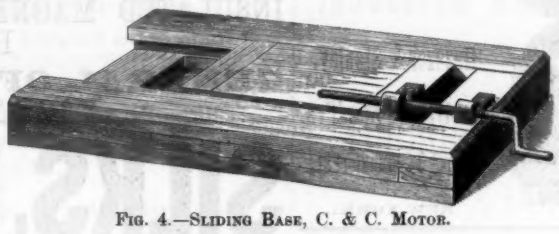


FIG. 4.—SLIDING BASE, C. & C. MOTOR.

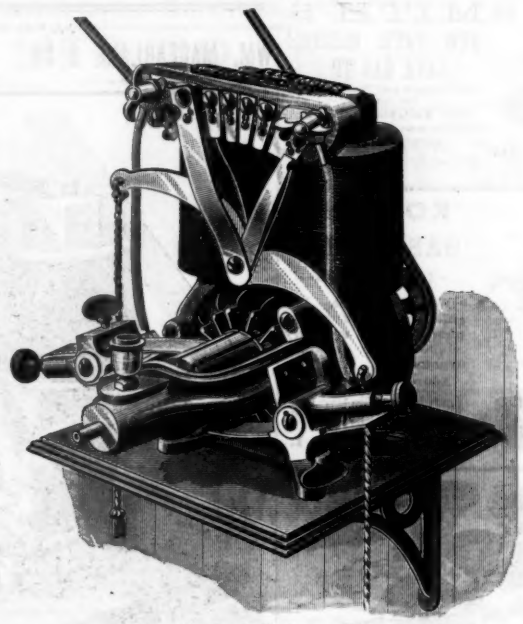


FIG. 3.—C. & C. SMALL MOTOR.

FIG. 1.—ARC MOTOR, C. & C. COMPANY.

—— The machinery for the electric light plant at Council Grove, Kas., has been ordered.

—— A correspondent writes to the *London Electrician* from Madeira, saying: "I shall feel much obliged if you will kindly draw the attention of your numerous readers to the fact that the Municipality of Funchal have published an advertisement in the *Diario de Noticias*, inviting tenders for lighting the new theatre 'D. Maria Pia,' and the city of Funchal with electric light. Applications for plans and all particulars should be addressed to the President of the Municipality, the Visconde do Ribeiro Real, Funchal, Madeira."

—— According to Dr. Schilling, the number of electric light installations in the thirteen principal towns of Germany has increased during the last two years from 131 to 604; the number of arc lamps has increased from 591 to 3,280, and the number of incandescents from 10,403 to 50,469. The number of gas lamps in these thirteen towns is 1,221,882, and therefore, lamp for lamp, electricity furnishes about 4 per cent. of the total illumination. In Munich this proportion is as high as 8 per cent. According to another authority there are in Hamburg at the present time 78 installations of electric light; 325 arc lamps and 5 300 incandescents About 1,000 horsepower is employed for these installations, of which one-fifth is furnished by gas engines.

ELECTRIC LIGHT NEWS

—— Burton, Kansas, has decided in favor of electric lights.

—— The Chicago Gas Trust is having a stormy time just at present.

—— G. P. Warner has made a proposition to erect an electric lighting plant at Orange, Mass.

—— The wire manufacturers met in New York last week and conferred over the price of wire.

—— The new Broadway Theater is to be lighted by electricity. The Edison system will be used.

—— The Thomson-Houston Company has been awarded the contract for electric lighting at Arlington, N. J.

—— Glendale, Ohio, would like the electric light for five years. Mr. Alfred M. Allen, of that city, is interested.

—— The Vienna opera house is to be lighted with electricity; 744 horse power boilers (Babcock & Wilcox) will be used.

—— All the stock of a $10,000 electric light company has been subscribed for at Hutchinson, Kas., and the plant will be put in at once.

—— The Commercial Cable Company's repair ship, Captain Trot in command, has had a copy of Mr. S. S. Wheeler's new wire gauge framed and placed in the cabin for reference.

—— H. H. Corson, representing the Thomson-Houston Electric Light Co., of Boston, Mass., is negotiating for the erection of electric light plants for Bristol, Tenn., and Goodson, Va.

—— The Passaic City Light, Heat and Power Company has been organized and applied to the city council for permission to run wires throughout the city for lighting dwellings and stores.

—— At Alton, Ill., the gas committee of the council has reported in favor of the substitution of twenty electric street lights, in place of others to be removed, and recommended that the contract be given to the electric light company now holding the privilege. The report was adopted, and the committee empowered to make it.

—— A gigantic dynamo for the works of the Cowles Electric Smelting and Aluminum Company, at Stoke-on-Trent, England, is now in course of erection. The machine has been built by Messrs. R. E Crompton & Co., of the Arc Works, Chelmsford, and will have, it is said, a minimum capacity of 300,000 watts, requiring 500 horse power to drive it.

—— The Elmira (N. Y.) Illuminating Co., Mr. F. A. Cheney, manager, is improving its plant to conform with the wide-awake and businesslike methods that characterize the work of Mr. Cheney. A large new station is in course of construction, and a 500 horse power (Watts-Campbell) engine has been added to the present power. There are over 5,000 incandescent lamps in use in that city, and 100 arc—a remarkably good showing for the little city of Elmira. Both the United States and Thomson-Houston systems are used.

—— Chas. A. Schieren & Co. report sales of electric leather belting to the following parties during the past week: Glens Falls Electric Light and Power Co., Glens Falls, N. Y., 56 feet 8-inch double belt, 33 feet 10-inch double belt; Edison Electric Light Co., York, Pa., 60 feet 5-inch double belt, 80 feet 8-inch double belt; Skowhegan Electric Light Co., Skowhegan, Me., 58 feet 9-inch double belt; Allbright's Sons & Co., Allentown, Pa., 80 feet 10-inch double belt; H. L. Childs & Co, Pittsburgh, Pa, 79 feet 24-in. double belt; Cross, Austin & Co, Brooklyn, N. Y., 52 feet 15-inch double belt; Geo. W. Childs, Philadelphia, Pa., 90 feet 8-inch double belt.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING NOV. 22, 1887.

373,485 Galvanic battery; Horatio J. Brewer, New York, N. Y.

373,508 Printing telegraph; Charles J. Wiley, Brooklyn, N. Y.

373,519 Telephone apparatus; Isaiah H. Farnham, Malden, Mass., assignor to the New England Telephone Co., New York, N. Y.

373,584 Dynamo electric machine; Thomas A. Edison, Llewellyn Park, N. J.

373,691 Apparatus for purifying and separating fatty substances by electricity; Heinrich F. D. Schwahn, Kansas City, Mo.

373,739 Prevention of sparking in electric motors and generators; Daniel Higham, Philadelphia, Pa., assignor to the Higham Electric Motor Company, same place.

373,759 Electric coupling; George W. Taylor, Leavittsburg, Ohio.

373,761 Electric arc lamp; Gustav A. Wiese, San Francisco, Cal.

373 767 Device for attaching tablets to telephones, Howard H. Butler, Canton, Ohio, assignor of one-half to Charles C. Cook, same place.

Business Notice.

At a fire in the Saratoga Hotel recently the alarm was given from the office to the guests in their rooms by the Fire Alarm and Guest Call put in by the Western Electric Company, "and many lives were saved thereby," the architect of the building says.

The following letter in regard to the Western Electric Company's hotel apparatus testifies to the merits of this system:

ST. LOUIS, Mo., Oct. 28, 1887.

WESTERN ELECTRIC COMPANY,
CHICAGO.

GENTLEMEN: Please find inclosed my check in payment of the accompanying bill.

Permit me to say that the system is working with admirable success, and is giving excellent satisfaction. I am much pleased with its introduction into my hotel, and pay this bill with much cheerfulness, believing that I am getting full value received for the money. Yours truly,

(Signed) J. L. GRISWOLD.

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Manufacturer of ELECTRICAL CONDENSERS.
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The Cheapest and Best Burner in the market
For Multiple Lighting.
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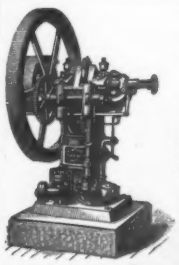
6 West 14th St., New York.
Patented Jan. 22, 1884



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Eagle and Dynamo Electric Light Belt.
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W. J. Buckley, Mgr. Ft. Wayne Jenny El. Light Co.
Thomson-Houston Electric Light, Herbert Wadsworth, Manager Western Office.
Brush Electric Co., Alex. Kempt, Special Agent.
Excelsior Electric Co., C. J. Reilly, Western Mgr.
Sperry Electric Light Motor & Car Brake Co., 201 Royal Insurance Building.
J. H. Reid, General Manager of the Mather Electric Light Co., Chicago.
Wm. H. Purdey, Comm. of Public Works, Chicago.
John Mah, Chief Engin'r of Board of Trade, Chic.
C. J. Meimes, Gen'l Sup't Thomson-Houston Light, Omaha, Neb.
J. A. Corbey, St. Joe Electric Light and Power Co., St. Joe, Mo.
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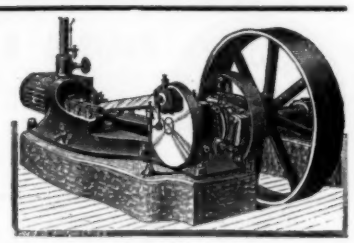

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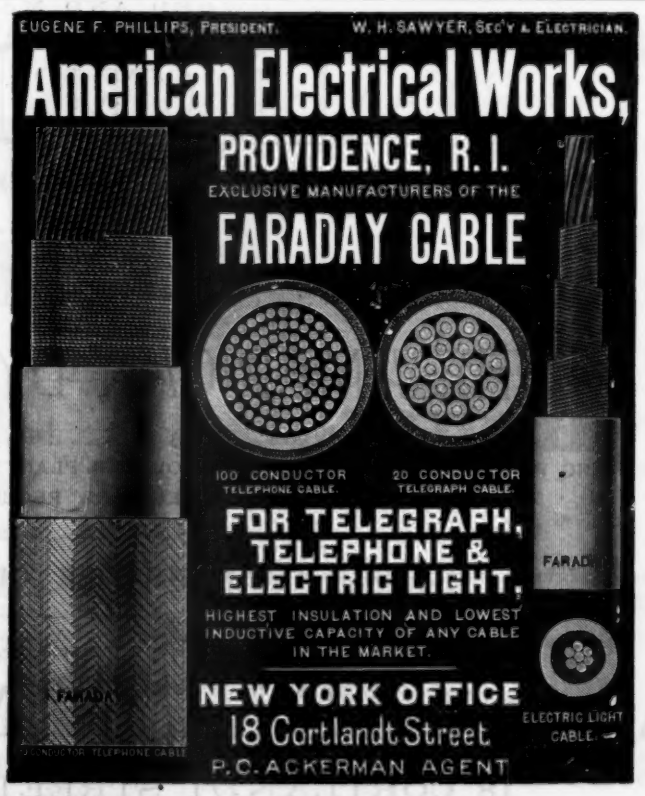
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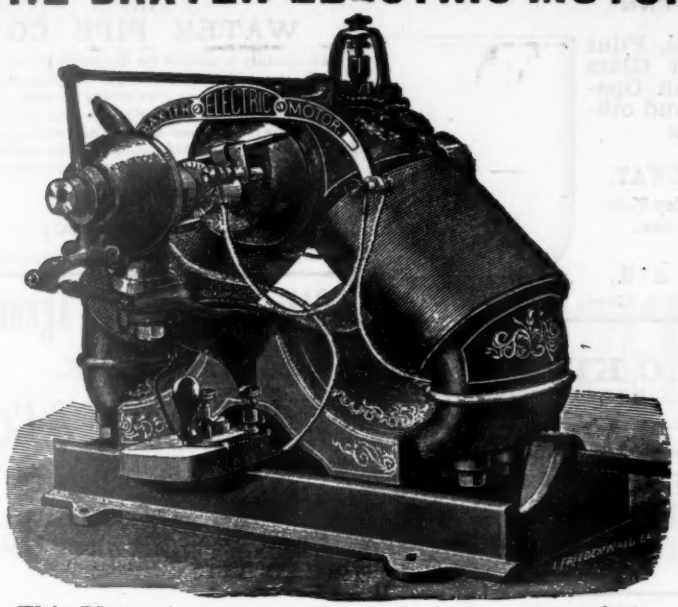

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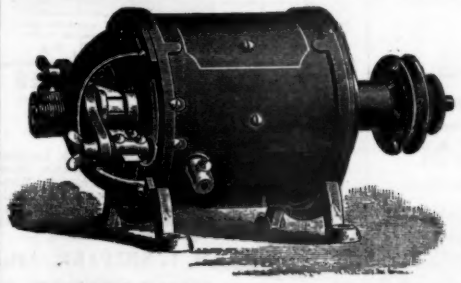

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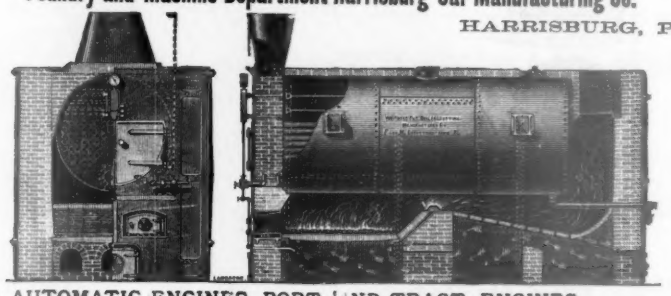

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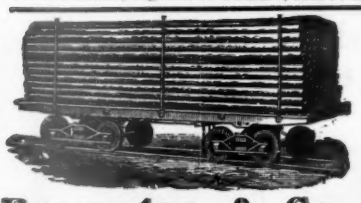

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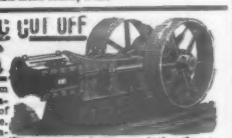

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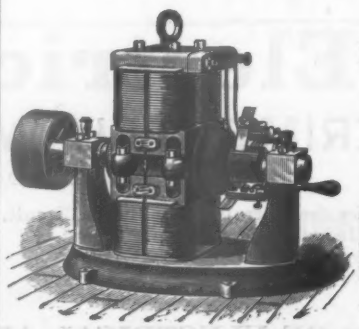

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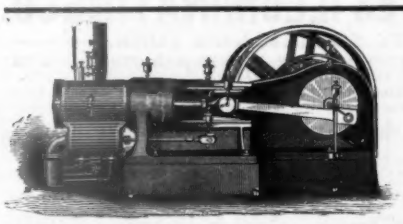

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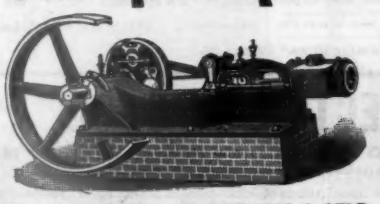

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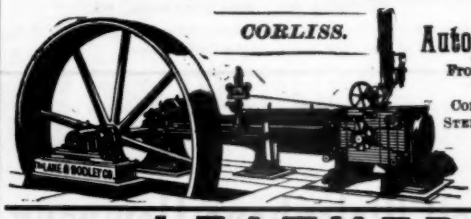

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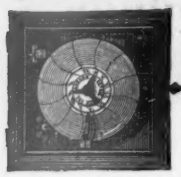

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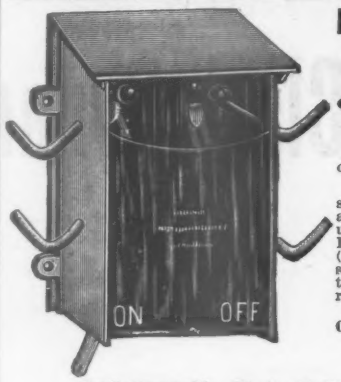

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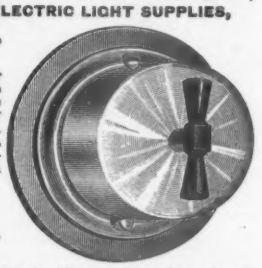

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Said letters patent cover all known forms of storage batteries wherein the electrodes comprise a support, combined or associated with a mechanically mixed or applied active material as well as other forms of storage batteries.

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We have brought suit in the Circuit Court of the United States for the Southern District of New York against the Julien Electric Company for infringing our patents by the manufacture, use and sale of storage batteries having electrodes consisting of a support combined or associated with a mechanically applied active material.

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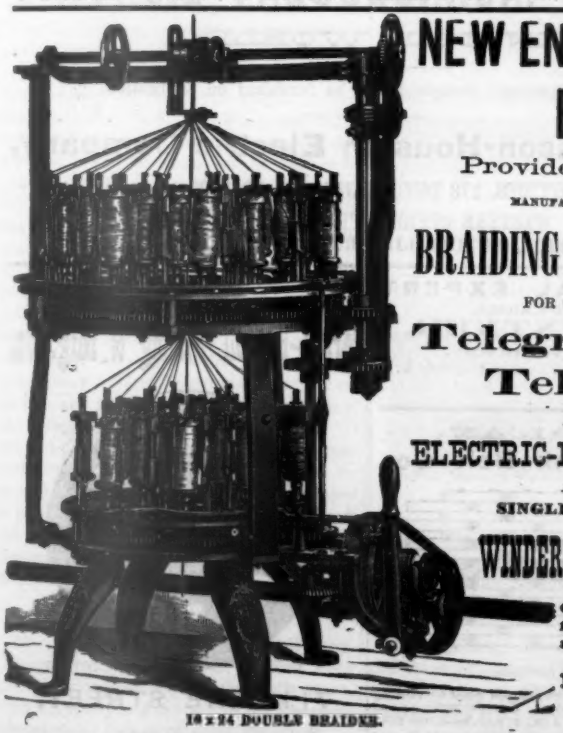

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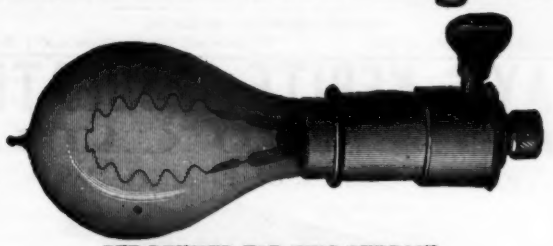

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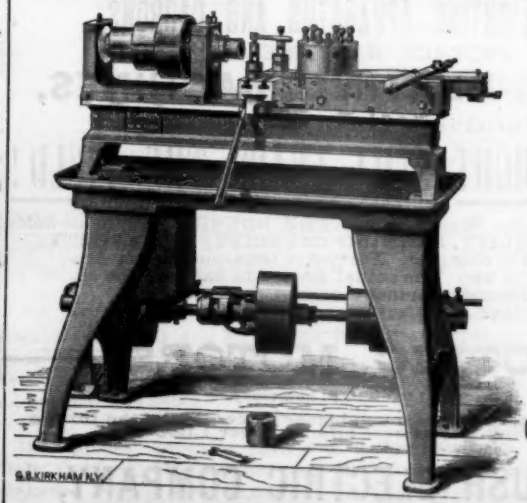

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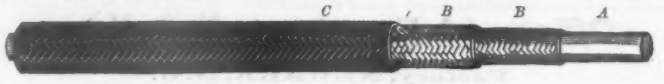

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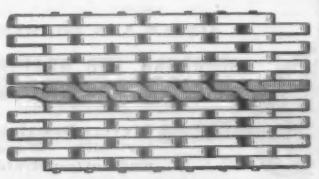

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